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In cooperation with
San Carlos Apache Tribe,
San Carlos Apache Natural
Resources Conservation
District;
United States Department
of the Interior, Bureau of
Indian Affairs; and Arizona
Agricultural Experiment
Station

Soil Survey of San Carlos Indian Reservation, Arizona, Parts of Gila and Graham Counties



How To Use This Soil Survey

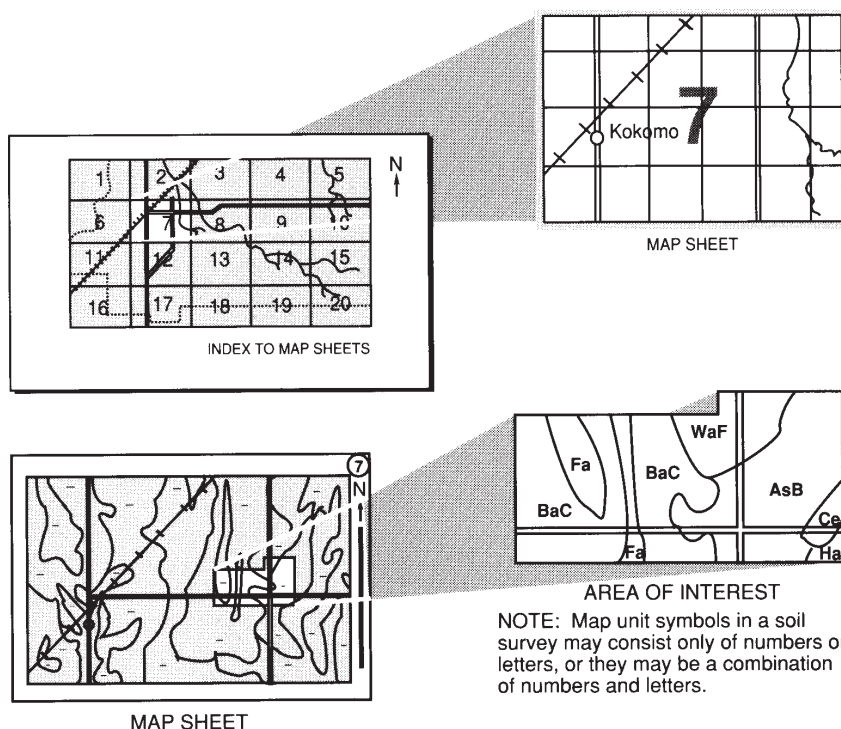
Detailed Soil Maps

The detailed soil maps can be useful in planning the use and management of small areas.

To find information about your area of interest, locate that area on the **Index to Map Sheets**. Note the number of the map sheet and turn to that sheet.

Locate your area of interest on the map sheet. Note the map unit symbols that are in that area. Turn to the **Contents**, which lists the map units by symbol and name and shows the page where each map unit is described.

The **Contents** shows which table has data on a specific land use for each detailed soil map unit. Also see the **Contents** for sections of this publication that may address your specific needs.



National Cooperative Soil Survey

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (formerly the Soil Conservation Service) has leadership for the Federal part of the National Cooperative Soil Survey. This survey was made cooperatively by the Natural Resources Conservation Service, the San Carlos Apache Tribe, the San Carlos Apache Natural Resources Conservation District, the United States Department of the Interior, Bureau of Indian Affairs, and the Arizona Agricultural Experiment Station. The survey is part of the technical assistance furnished to the San Carlos Apache Natural Resources Conservation District and the Bureau of Indian Affairs.

Major fieldwork for this soil survey was completed in 2008. Soil names and descriptions were approved in April, 2009. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 2008. The most current official data are available at <http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>.

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Cover: This photo shows the Salt River Canyon. The canyon walls are Rock outcrop-Argiustolls-Haplustepts association, 40 to 80 percent slopes. The flood plain of the Salt River is Ustifluvents soils, Riverwash, Rock outcrop, and Water, 0 to 2 percent slopes.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at <http://www.nrcs.usda.gov>.

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Foreword

Soil surveys contain information that affects land use planning in survey areas. They include predictions of soil behavior for selected land uses. The surveys highlight soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

Soil surveys are designed for many different users. Farmers, ranchers, foresters, and agronomists can use the surveys to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the surveys to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the surveys to help them understand, protect, and enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. Soils that have many rock fragments on the surface or are steeply sloping are poorly suited for camping and hiking.

These and many other soil properties that affect land use are described in this soil survey. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described, and information on specific uses is given. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service.

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Soil Survey of San Carlos Indian Reservation, Arizona, Parts of Gila and Graham Counties

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United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with the San Carlos Apache Tribe, San Carlos Apache Natural Resources Conservation District; United States Department of the Interior, Bureau of Indian Affairs; and Arizona Agricultural Experiment Station.

General Nature of the Survey Area

The San Carlos Indian Reservation is located in the central part of eastern Arizona (fig. 1). It includes parts of Gila, Graham, and Pinal Counties. The northern boundary is the Salt and Black Rivers. The survey area covers about 1,827,421 acres.

The survey area is dominantly within Major Land Resource Area 38—Mogollon Transition, but also includes small areas of Major Land Resource Area 39—Arizona and New Mexico Mountains, 40—Sonoran Desert, and 41—Southeastern Arizona Basin and Range. This area is in the Mexican Highland Section of the Basin and Range Physiographic Province (Fenneman, 1931 and 1946) and is characterized by mountains, canyons, and structural troughs or valleys. Igneous, metamorphic, and sedimentary rock classes occur on rough mountainous terrain in association with less extensive sediment filled valleys.

This area has been the site of intensive volcanism that formed the Gila, Mescal, Natanes, and Santa Teresa Mountains. These mountain ranges are mostly parallel to each other and run from northwest to southeast. The valleys in between generally contain deep alluvial sediments that have washed out of the surrounding mountains. Elevation ranges from about 2,000 feet along the Gila River in the southwest to over 7,500 feet in the northeast. The average annual precipitation ranges from about 10 to 28 inches per year and average annual air temperature ranges from about 40 to 67 degrees Fahrenheit.

The survey area has two major drainage systems. The Salt River and its tributary, the Black River, form the northern boundary and flow generally west. The Gila River and its tributary, the San Carlos River, drain the southern and central parts of the survey area. The Coolidge Dam is located at the confluence of the Gila and San Carlos Rivers and forms the San Carlos Reservoir.

The major land uses in the area are cattle grazing, timber production, recreation, and wildlife habitat. A few areas along the Gila and San Carlos Rivers are used for crop production.

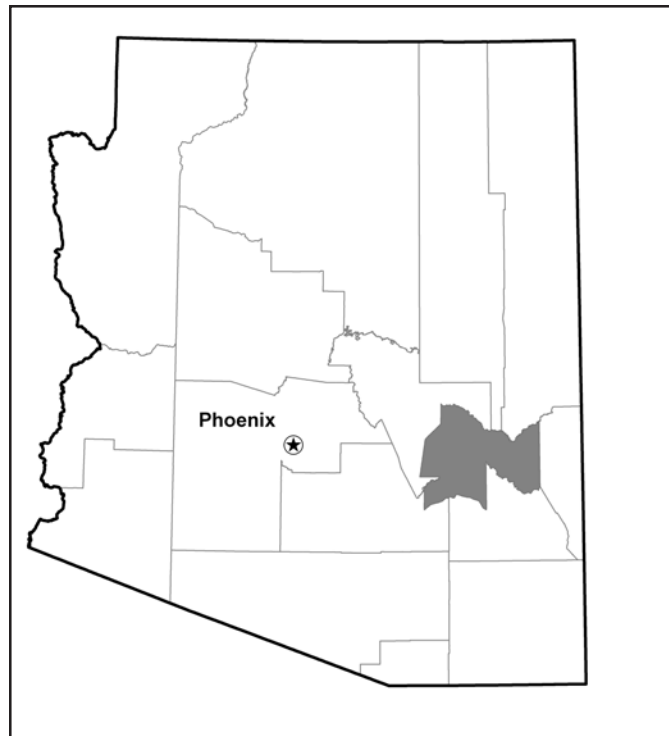


Figure 1.—Location of the San Carlos Indian Reservation in Arizona

Transportation

The only Federal highway that serves the survey area is U.S. Highway 70, which runs east to west through the southern part of survey area. Arizona Highway 77 runs north to south nearly parallel and outside of the western boundary of the survey area. No commercial airlines serve the survey area, but a small general aviation airport is located at the Apache Gold Casino, about 5 miles east of Globe, Arizona.

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and their location and a discussion of their suitability, limitations, and management for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed.

Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

This survey area was mapped at two levels of detail. At the more detailed level, map units are narrowly defined. Map unit boundaries were plotted and verified at closely spaced intervals. At the less detailed level, map units are broadly defined. Boundaries were plotted and verified at wider intervals. The detail of mapping was selected to meet the anticipated long-term use of the survey, and the map units were designed to meet the needs for that use.

Formation and Classification of the Soils

Formation of the Soils

Soil is a natural, three-dimensional body on the surface of the earth that supports plant growth. Soil is formed by the action of soil-forming processes on material deposited or accumulated by geologic forces. The characteristics of a soil at any given point depend on the physical and mineralogical composition of the parent material, the climate under which the soil material has accumulated and has existed since accumulation, relief or topography, the plant and animal life on and in the soil, and the length of time the forces of soil development have acted on the soil material. All five of these factors are important in the genesis of each soil. Some have had more influence than others on a given soil.

Parent Material

Soils form in unconsolidated material that influences the rate of formation and the chemical, physical, and mineralogical composition of the soil. It affects color, texture, fertility, and other characteristics of the soil. This material may be weathered directly from the bedrock (residuum), or transported and deposited by water (alluvium), wind (eolian material), or gravity (colluvium). Many soils form in a combination of these major types of parent material. The soils in this survey area formed in a wide variety of parent materials.

Climate

Climate, past and present, is a major factor in soil formation. Temperature, precipitation, humidity, and wind affect the type and rate of chemical and physical processes occurring within the parent material. These processes include the accumulation of organic matter, leaching of salts, freezing and thawing, the type and rate of weathering of the soil mineral constituents, and other processes that influence the development of diagnostic soil features. In general, the intensity of weathering processes increases as both temperature and moisture increase.

Topography

Topography, or relief, influences soil formation mainly through its effect on water movement, erosion, soil temperature, stability of soil material, and the kind of plant cover. The rate of surface water runoff and the extent of erosion by water or gravitational forces increase as slope increases. This reduces the amount of water infiltrating into the soil that is available for plant growth and soil formation. Northern aspects of steep slopes receive less solar radiation than southern aspects and consequently lose less moisture to evapotranspiration. Generally soils on less sloping areas are more stable and have more soil development than soils on steeper slopes.

Living Organisms

Plants, animals, fungi, insects, and microorganisms have a direct influence on the formation of soils. The native cacti, grasses, shrubs, and trees have had different effects on the losses and gains of organic matter and plant nutrients and on soil structure and porosity. Surface plants add organic matter to the soil, create pores and channels with rooting networks, decrease the extent of erosion and the rate of surface water runoff, and affect physical and chemical properties with their decomposed residue. Animals, insects, and worms burrow into the soil, redistributing soil material and creating channels for air and water movement. Within the soil, the life processes of bacteria, algae, fungi, and protozoa decompose organic matter and minerals, releasing oxygen, carbon dioxide, and nitrogen to plants.

Time

Time refers to the duration of the period that a parent material has been in place and has been influenced by other soil-forming factors. The length of time needed for the development of genetic soil horizons depends on the intensity and interactions of the other soil-forming factors in promoting the losses, gains, transfers, or transformations of the constituents necessary in horizon development. Soils that do not have definite genetic horizons are young or immature. Soils on flood plains are examples of young soils because they are subject to constant reworking and deposition of sediment during periods of flooding. Also, many soils on steep and very steep slopes are subject to the influence of gravity and erosion and thus do not have enough time to develop genetic horizons. Mature or older soils have approached equilibrium with their environment and tend to have well defined horizons. Mature soils occur on stable landform positions that tend to be less sloping and are not subject to flooding.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1999 and 2006). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Aridisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Argid (*Arg*, meaning argillic horizon, plus *id*, from Aridisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplargid (*Hapl*, meaning minimal horization, plus *argid*, the suborder of the Aridisols that has an argillic horizon).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great

group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Ustic* identifies the subgroup having a soil moisture regime that borders on ustic. An example is Ustic Haplargids.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is clayey-skeletal, mixed, superactive, thermic Ustic Haplargids.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. An example is the Eloma series.

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. The soils of a given series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of

the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Eloma very gravelly sandy clay loam, 3 to 65 percent slopes, is a phase of the Eloma series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Kuykendall-Beaumont-Rock outcrop complex, 5 to 45 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Ess-Pocomate family association, 20 to 70 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Wetrock, Vinton, and Typic Fluvaquents soils, and Water, 1 to 3 percent slopes is an undifferentiated group in this survey area.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

In the map unit descriptions, each soil series recognized in the survey area is described. Characteristics of the soil and the material in which it formed are identified for each series for a particular map unit. A pedon, a small three-dimensional area of soil, which is typical of the series within that map unit in the survey area, is described. The detailed description of each soil horizon follows standards in the "Soil Survey Manual" (Soil Survey Division Staff, 1993) and in the "Field Book for Describing and Sampling Soils" (Schoeneberger, et al., 2002). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (Soil Survey Staff, 1999) and in "Keys to Soil Taxonomy" (Soil Survey Staff, 2006). Unless otherwise indicated, colors in the descriptions are for dry soil. Following the pedon description is the range of important characteristics of the soils in the series.

Some of the soil series described in this survey use the typical pedons for series described in the Soil Survey of Eastern Pinal and Southern Gila Counties, Arizona.

1—Agustin gravelly coarse sand, 1 to 5 percent slopes

Map Unit Setting

Landform(s): alluvial fans

Elevation: 2,500 to 3,800 feet (762 to 1,158 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 60 to 67 degrees F (15.6 to 19.4 degrees C)

Mean annual soil temperature: 62 to 69 degrees F (16.7 to 20.5 degrees C)

Frost-free period: 190 to 250 days

Major Land Resource Area: 41-Southeastern Arizona Basin and Range

Land Resource Unit: 41-2 Chihuahuan-Sonoran Desert Shrub Mix

Map Unit Composition

Agustin and similar soils: 90 percent

Minor components: Bucklebar soils occur on slightly higher, more stable areas.

Anthony soils occur along drainageways.

Soil Properties and Qualities

Agustin soils

Taxonomic classification: Coarse-loamy, mixed, superactive, thermic Typic Haplocambids

Geomorphic position: generally occurs on toe slopes below fan terrace sediments

Parent material: alluvium from gypsiferous lacustrine sediments

Slope: 1 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 60 percent

woody debris: 5 percent

bare soil: 10 percent

rock fragments

fine gravel: 20 percent

medium gravel: 10 percent

coarse gravel: 20 percent

Drainage class: well drained

Ksat solum: 1.98 to 39.69 inches per hour (14.00 to 280.00 micrometers per second)

Available water capacity total inches: 5.4 (moderate)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: very rare

Runoff class: very low

Hydrologic group: A

Ecological site name: Limy Fan 8-12" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R041XB206AZ

Present vegetation: creosotebush, annual grasses, mesquite

Land capability (irrigated): 4e

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 300 feet north and 1,550 feet west of southeast corner of Section 4, Township 4 S, Range 22 E

Geographic Coordinate System:

33° 6' 28.00" north, 110° 5' 31.00" west

A1—0 to 1 inch (0 to 3 cm); brown (10YR 5/3) gravelly coarse sand, brown (10YR 4/3), moist; 5 percent clay; weak very fine and fine subangular blocky parting to

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single grain structure; loose, nonsticky and nonplastic; many very fine roots; many very fine pores; 25 percent gravel; noneffervescent; slightly alkaline, pH 7.4; abrupt smooth boundary.

A2—1 to 5 inches (3 to 13 cm); yellowish brown (10YR 5/4) sandy loam, dark brown (10YR 3/3), moist; 12 percent clay; weak fine and medium subangular blocky parting to weak fine granular structure; soft, loose, nonsticky and nonplastic; many very fine roots; many very fine pores; 10 percent gravel; noneffervescent; slightly alkaline, pH 7.6; clear smooth boundary.

Bky1—5 to 23 inches (13 to 58 cm); yellowish brown (10YR 5/4) gravelly sandy loam, dark brown (10YR 3/3), moist; 14 percent clay; massive; loose, nonsticky and nonplastic; many very fine and fine and common medium and coarse roots; many very fine pores; many prominent carbonate coats on rock fragments; few fine platy gypsum crystals; 15 percent gravel; strongly effervescent, 1 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; clear wavy boundary.

Bky2—23 to 53 inches (58 to 135 cm); light yellowish brown (10YR 6/4) gravelly sandy loam, dark brown (10YR 3/3), moist; 16 percent clay; massive; loose, nonsticky and nonplastic; many very fine and fine roots; many very fine pores; many prominent carbonate coats on rock fragments; few fine platy gypsum crystals; 20 percent gravel; strongly effervescent, 2 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; clear wavy boundary.

Bky3—53 to 60 inches (135 to 152 cm); pale brown (10YR 6/3) gravelly sandy loam, dark brown (10YR 3/3), moist; 14 percent clay; massive; loose, nonsticky and nonplastic; common very fine roots; many very fine pores; many prominent carbonate coats on rock fragments; few fine platy gypsum crystals; 15 percent gravel; strongly effervescent, 2 percent calcium carbonate equivalent; strongly alkaline, pH 8.6.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 18 percent

Rock fragments: 0 to 30 percent

Gypsum: 0 to 5 percent

Calcium carbonate equivalent: 0 to 5 percent

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 6 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Texture: coarse sand, sandy loam, loam

Rock fragments: 5 to 25 percent

Effervescence: none to violent

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

Bky horizons

Hue: 7.5YR, 10YR

Value: 3 to 6 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Texture: sandy loam, sandy clay loam, loamy coarse sand

Rock fragments: 0 to 30 percent

Effervescence: strong to violent

Reaction (pH): strongly alkaline (8.5 to 9.0)

2—Agustin-Urban land complex, 1 to 5 percent slopes

Map Unit Setting

Landform(s): alluvial fans

Elevation: 2,500 to 3,600 feet (762 to 1,097 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 60 to 67 degrees F (15.6 to 19.4 degrees C)

Mean annual soil temperature: 62 to 69 degrees F (16.7 to 20.5 degrees C)

Frost-free period: 190 to 250 days

Major Land Resource Area: 41-Southeastern Arizona Basin and Range

Land Resource Unit: 41-2 Chihuahuan-Sonoran Desert Shrub Mix

Map Unit Composition

Agustin and similar soils: 55 percent

Urban land: 35 percent

Minor components: Gila soils occur along the border of the Gila River flood plain.

Anthony soils occur along drainageways.

Soil Properties and Qualities

Agustin soils

Taxonomic classification: Coarse-loamy, mixed, superactive, thermic Typic

Haplocambids

Geomorphic position: generally occurs on toe slopes below fan terrace sediments

Parent material: mixed, gypsiferous, coarse-loamy alluvium

Slope: 1 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 60 percent

woody debris: 5 percent

bare soil: 10 percent

rock fragments

fine gravel: 20 percent

medium gravel: 10 percent

coarse gravel: 20 percent

Drainage class: well drained

Ksat solum: 1.98 to 39.69 inches per hour (14.00 to 280.00 micrometers per second)

Available water capacity total inches: 5.4 (moderate)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: very rare

Runoff class: very low

Hydrologic group: A

Ecological site name: Limy Fan 8-12" p.z.

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Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R041XB206AZ

Present vegetation: creosotebush, annual grasses, mesquite

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 1,550 feet west and 300 feet north of southeast corner of Section 4, Township 4 S, Range 22 E

Geographic Coordinate System:

33° 6' 28.00" north, 110° 5' 31.00" west

A1—0 to 1 inch (0 to 3 cm); brown (10YR 5/3) gravelly coarse sand, brown (10YR 4/3), moist; 5 percent clay; weak very fine and fine subangular blocky parting to single grain structure; loose, nonsticky and nonplastic; many very fine roots; many very fine pores; 25 percent gravel; noneffervescent; slightly alkaline, pH 7.4; abrupt smooth boundary.

A2—1 to 5 inches (3 to 13 cm); yellowish brown (10YR 5/4) sandy loam, dark brown (10YR 3/3), moist; 12 percent clay; weak fine and medium subangular blocky parting to weak fine granular structure; soft, loose, nonsticky and nonplastic; many very fine roots; many very fine pores; 10 percent gravel; noneffervescent; slightly alkaline, pH 7.6; clear smooth boundary.

Bky1—5 to 23 inches (13 to 58 cm); yellowish brown (10YR 5/4) gravelly sandy loam, dark brown (10YR 3/3), moist; 14 percent clay; massive; loose, nonsticky and nonplastic; many very fine and fine and common medium and coarse roots; many very fine pores; many prominent carbonate coats on rock fragments; few fine platy gypsum crystals; 15 percent gravel; strongly effervescent, 1 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; clear wavy boundary.

Bky2—23 to 53 inches (58 to 135 cm); light yellowish brown (10YR 6/4) gravelly sandy loam, dark brown (10YR 3/3), moist; 16 percent clay; massive; loose, nonsticky and nonplastic; many very fine and fine roots; many very fine pores; many prominent carbonate coats on rock fragments; few fine platy gypsum crystals; 20 percent gravel; strongly effervescent, 2 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; clear wavy boundary.

Bky3—53 to 60 inches (135 to 152 cm); pale brown (10YR 6/3) gravelly sandy loam, dark brown (10YR 3/3), moist; 14 percent clay; massive; loose, nonsticky and nonplastic; common very fine roots; many very fine pores; many prominent carbonate coats on rock fragments; few fine platy gypsum crystals; 15 percent gravel; strongly effervescent, 2 percent calcium carbonate equivalent; strongly alkaline, pH 8.6.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 18 percent

Rock fragments: 0 to 30 percent

Gypsum: 0 to 5 percent

Calcium carbonate equivalent: 0 to 5 percent

A horizon

Hue: 7.5YR, 10YR

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Value: 3 to 6 dry, 3 to 4 moist
Chroma: 3 to 4, dry or moist
Texture: coarse sand, sandy loam, loam
Rock fragments: 5 to 25 percent
Effervescence: none to violent
Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 8.4)

Bky horizons

Hue: 7.5YR, 10YR
Value: 3 to 6 dry, 3 to 4 moist
Chroma: 3 to 4, dry or moist
Texture: sandy loam, sandy clay loam, loamy coarse sand
Rock fragments: 0 to 30 percent
Effervescence: strong to violent
Reaction (pH): strongly alkaline (8.5 to 9.0)

Urban land

Slope: 1 to 5 percent

Range in Characteristics

Urban land consists of areas of soil so altered by construction or obscured by structures and pavement that identification of the soil is difficult or impossible. In general, the underlying and interspersed soil material has many of the characteristics of the associated soils in this unit.

3—Anezul-Dedal-Rock outcrop complex, 2 to 20 percent slopes

Map Unit Setting

Landform(s): plateaus
Elevation: 5,800 to 7,200 feet (1,768 to 2,195 meters)
Mean annual precipitation: 18 to 24 inches (457 to 610 millimeters)
Mean annual air temperature: 45 to 57 degrees F (7.0 to 13.9 degrees C)
Mean annual soil temperature: 47 to 59 degrees F (8.1 to 15.0 degrees C)
Frost-free period: 120 to 180 days
Major Land Resource Area: 38-Mogollon Transition
Land Resource Unit: 38-3 Interior Chaparral-Forests

Map Unit Composition

Anezul and similar soils: 55 percent
Dedal and similar soils: 25 percent
Rock outcrop: 12 percent
Minor components: Brolliar soils occur throughout the unit. Frazwell family soils occur along small drainageways.

Soil Properties and Qualities

Anezul soils

Taxonomic classification: Clayey, smectitic, mesic Lithic Argiustolls
Geomorphic position: generally occurs on the summit of the Natanes Plateau where andesite or basalt bedrock is less than 20 inches below the surface
Parent material: clayey alluvium and/or residuum weathered from basalt
Slope: 2 to 20 percent

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Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

tree canopy cover: 10 percent

plant cover: 51 percent

woody debris: 0 percent

bare soil: 40 percent

rock fragments

gravel: 8 percent

cobble: 2 percent

Depth to restrictive feature(s): 7 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 1.9 (very low)

Shrink-swell potential: about 10.5 LEP (very high)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Clay Loam Upland 20-24" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XC303AZ

Present vegetation: blue grama, broom snakeweed, shrubby buckwheat, sideoats grama, spidergrass, threeawn, perennial forbs, hairy grama, spike muhly, western wheatgrass, alligator juniper

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,390 feet south and 50 feet east of northwest corner of Section 10, Township 1 S, Range 26 E

Geographic Coordinate System:

33° 21' 38.90" north, 109° 40' 28.30" west

A—0 to 3 inches (0 to 8 cm); brown (7.5YR 4/3) gravelly clay loam, dark brown (7.5YR 3/2), moist; 30 percent clay; moderate fine subangular blocky parting to moderate fine and medium granular structure; slightly hard, very friable, moderately sticky and moderately plastic; many very fine and fine and few medium roots; many very fine and fine pores; 12 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt—3 to 16 inches (8 to 41 cm); dark reddish brown (5YR 3/3) gravelly clay, dark reddish brown (5YR 3/3), moist; 55 percent clay; moderate medium prismatic parting to strong fine and medium angular blocky structure; extremely hard, extremely firm,

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very sticky and very plastic; common very fine and fine and few medium roots; many very fine and fine pores; many distinct pressure faces; many prominent clay films on rock fragments; 15 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 7.2; very abrupt wavy boundary.

R—16 to 60 inches (41 to 152 cm); andesite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 60 percent

Rock fragments: 5 to 35 percent

Effervescence: none to slight

Reaction (pH): slightly acid to slightly alkaline (6.1 to 7.8)

A horizon

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay loam, loam

Rock fragments: 5 to 30 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay, clay loam

Rock fragments: 5 to 35 percent

R horizon

Bedrock is andesite or basalt

Dedal soils

Taxonomic classification: Clayey-skeletal, smectitic, mesic Lithic Argiustolls

Geomorphic position: generally occurs on the summit of the Natanes Plateau where andesite or basalt bedrock is less than 20 inches below the surface

Parent material: clayey alluvium and/or residuum weathered from volcanic rock

Slope: 2 to 20 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

tree canopy cover: 15 percent

plant cover: 30 percent

woody debris: 0 percent

bare soil: 19 percent

rock fragments

gravel: 20 percent

cobble: 25 percent

stone: 5 percent

boulder: 1 percent

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Depth to restrictive feature(s): 7 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.00 to 1.98 inches per hour (0.01 to 14.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 1.4 (very low)

Shrink-swell potential: about 10.5 LEP (very high)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Clay Loam Upland 20-24" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XC303AZ

Present vegetation: blue grama, broom snakeweed, shrubby buckwheat, sideoats grama, spidergrass, threeawn, perennial forbs, hairy grama, spike muhly, western wheatgrass, alligator juniper

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,500 feet south and 120 feet east of the northwest corner of Section 10, Township 1 S, Range 26 E

Geographic Coordinate System:

33° 21' 37.70" north, 109° 40' 27.40" west

A—0 to 1 inch (0 to 3 cm); brown (7.5YR 4/3) very cobbly loam, dark brown (7.5YR 3/3), moist; 26 percent clay; weak fine subangular blocky parting to moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine pores; 15 percent gravel and 30 percent cobble and 5 percent stone and 1 percent boulder; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

Bt1—1 to 8 inches (3 to 20 cm); dark brown (7.5YR 3/3) very cobbly clay loam, dark brown (7.5YR 3/2), moist; 35 percent clay; strong medium and coarse subangular blocky structure; moderately hard, friable, moderately sticky and moderately plastic; many very fine and fine and few medium and coarse roots; many very fine and fine pores; few distinct pressure faces; few distinct clay films on faces of peds and common distinct clay films on rock fragments; 10 percent gravel and 30 percent cobble and 5 percent stone; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt2—8 to 16 inches (20 to 41 cm); brown (7.5YR 4/3) very cobbly clay, dark brown (7.5YR 3/3), moist; 50 percent clay; strong medium and coarse angular blocky structure; very hard, firm, very sticky and very plastic; common very fine and fine and few medium and coarse roots; common very fine and fine pores; few prominent pressure faces; few prominent clay films on faces of peds and common prominent clay films on rock fragments; few medium carbonate masses; 10 percent gravel and 20 percent cobble and 5 percent stone; very slightly effervescent; slightly alkaline, pH 7.4; very abrupt wavy boundary.

R—16 to 60 inches (41 to 152 cm); andesite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

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Clay content: 35 to 55 percent
Rock fragments: 35 to 65 percent

A horizon

Hue: 5YR, 7.5YR
Value: 3 to 5 dry, 3 to 4 moist
Chroma: 2 to 3, dry or moist
Texture: loam, clay loam
Rock fragments: 15 to 65 percent
Effervescence: none
Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Bt horizons

Hue: 5YR, 7.5YR
Value: 4 to 5 dry, 3 to 4 moist
Chroma: 2 to 4, dry or moist
Texture: clay loam, clay, silty clay
Rock fragments: 35 to 65 percent
Effervescence: none to slight
Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

R horizon

Bedrock is andesite or basalt

Rock outcrop

Slope: 2 to 20 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops, ledges, and cliffs of Tertiary basalt, andesite, and other volcanic rocks. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

4—Anthony and Glendale soils, and Riverwash, 0 to 3 percent slopes

Map Unit Setting

Landform(s): flood plains

Elevation: 2,500 to 3,600 feet (762 to 1,097 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 60 to 67 degrees F (15.6 to 19.4 degrees C)

Mean annual soil temperature: 62 to 69 degrees F (16.7 to 20.5 degrees C)

Frost-free period: 190 to 250 days

Major Land Resource Area: 41-Southeastern Arizona Basin and Range

Land Resource Unit: 41-2 Chihuahuan-Sonoran Desert Shrub Mix

Stream Segment Properties and Qualities

Segment length: mainly consisting of about 15 miles of Seven Mile Wash.

Active flood plain width: 300 to 5,800 feet

Stream flow: intermittent

Flooding hazard: frequent; brief (2 to 7 days)

Flood month: December-February and July-September

Water table minimum depth: greater than 60 inches

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Bank entrenchment:

percent cut: 70

percent uncut: 30

vertical cut: 1 to 10 feet; averages 3 to 5 feet

Depositional bar features: dynamic system of braided bars and channels that relocate with each major flood event; height varies with the depth and velocity of flood water.

Meander pattern: irregular meander

Channel composition:

percent stones: 1

percent cobbles: 14

percent gravel: 25

percent sand: 40

percent silt and clay: 20

Stability: dynamic system of braided components that aggrades and degrades seasonally.

Map Unit Composition

Anthony and similar soils

Glendale and similar soils

Riverwash

Minor components: Queenecreek and Torrifluvents soils occur along stream channel adjacent to Riverwash. Gila soils occur on higher benches away from the stream channel.

This is an undifferentiated map unit. These components are not consistently associated geographically. At least one component is present in every delineation, but each delineation can have any combination of the components. This map unit is not consistent over time. The components of this map unit consist of a dynamic system of braided bars and channels. The active stream dynamics will cause these components to shift locations. During severe rainfall events, the channel will cut and fill throughout its length.

Soil Properties and Qualities

Anthony soils

Taxonomic classification: Coarse-loamy, mixed, superactive, calcareous, thermic

Typic Torrifluvents

Geomorphic position: generally occurs on higher benches

Parent material: mixed coarse-loamy alluvium

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

woody debris: 0 percent

bare soil: 30 percent

rock fragments

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fine gravel: 20 percent
medium gravel: 10 percent
coarse gravel: 5 percent

Drainage class: well drained

Ksat solum: 0.57 to 5.95 inches per hour (4.00 to 42.00 micrometers per second)

Available water capacity total inches: 7.4 (high)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: rare

Runoff class: low

Hydrologic group: B

Ecological site name: Sandy Wash 8-12" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R041XB213AZ

Present vegetation: mesquite, catclaw acacia, Mediterranean schismus-obselete, red brome, graythorn, saltcedar tamarisk, creosotebush, burroweed, desert broom baccharis, whitethorn, desert willow, redstem filaree

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 1,500 feet south and 1,350 feet west of northeast corner of Section 17, Township 1 N, Range 18 E

Geographic Coordinate System:

33° 25' 56.40" north, 110° 29' 5.80" west

A1—0 to 2 inches (0 to 5 cm); yellowish brown (10YR 5/4) loam, brown (10YR 4/3), moist; 15 percent clay; moderate medium platy and moderate fine subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine roots; many very fine pores; common fine carbonate masses on surfaces along root channels; 3 percent gravel; strongly effervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

A2—2 to 6 inches (5 to 15 cm); yellowish brown (10YR 5/4) loam, brown (10YR 4/3), moist; 18 percent clay; moderate medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine pores; common distinct carbonate coats on bottom surfaces of rock fragments; 2 percent gravel; violently effervescent; strongly alkaline, pH 8.6; abrupt wavy boundary.

Ck1—6 to 24 inches (15 to 61 cm); brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3), moist; 10 percent clay; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine and few medium and coarse roots; many very fine pores; very few distinct carbonate coats on rock fragments; 5 percent gravel; violently effervescent; strongly alkaline, pH 8.6; clear wavy boundary.

Ck2—24 to 36 inches (61 to 91 cm); brown (10YR 5/3) fine sandy loam, dark brown (7.5YR 3/3), moist; 7 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; many fine pores; very few distinct carbonate coats on rock fragments; 10 percent gravel; violently effervescent; strongly alkaline, pH 8.6; clear wavy boundary.

Ck3—36 to 60 inches (91 to 152 cm); brown (7.5YR 4/3) very cobbly sandy loam, dark brown (7.5YR 3/3), moist; 7 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many fine pores; common distinct

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carbonate coats on rock fragments; 20 percent gravel and 15 percent cobble and 1 percent stone; slightly effervescent; strongly alkaline, pH 8.6.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 18 percent

Rock fragments: 2 to 25 percent

Gypsum: 0 to 2 percent

Calcium carbonate equivalent: 1 to 5 percent

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Texture: loamy coarse sand, sandy loam, loam, fine sandy loam

Rock fragments: 2 to 40 percent

Effervescence: none to violent

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

Ck horizons

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Texture: sandy loam, fine sandy loam, loam, loamy coarse sand with strata of coarser or finer textures

Rock fragments: 2 to 40 percent

Effervescence: slight to violent

Reaction (pH): moderately alkaline to strongly alkaline (7.9 to 9.0)

Glendale soils

Taxonomic classification: Fine-silty, mixed, superactive, calcareous, thermic Typic Torrifluvents

Geomorphic position: generally occurs on higher benches away from the stream channel

Parent material: mixed fine-silty alluvium

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 100 percent

woody debris: 10 percent

bare soil: 0 percent

rock fragments

fine gravel: 5 percent

Drainage class: well drained

Ksat solum: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 12.9 (very high)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: very rare

Runoff class: low

Soil Survey of San Carlos Indian Reservation, Arizona

Hydrologic group: C

Ecological site name: Prosopis glandulosa var. torreyana-Prosopis velutina/
Sporobolus wrightii

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F041XB221AZ

Present vegetation: mesquite, foxtail barley, red brome, tansymustard, Cryptantha, whitethorn, catclaw acacia, redstem filaree, Mediterranean schismus-obselete, creosotebush, graythorn

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 1,400 feet south and 1,900 feet west of northeast corner of Section 17, Township 1 N, Range 18 E

Geographic Coordinate System:

33° 25' 55.90" north, 110° 29' 10.70" west

A—0 to 4 inches (0 to 10 cm); brown (7.5YR 5/4) silt loam, brown (7.5YR 4/4), moist; 20 percent clay; moderate medium and coarse subangular blocky structure; soft, loose, moderately sticky and moderately plastic; many very fine and fine roots; many very fine pores; 2 percent gravel; violently effervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

Ck1—4 to 28 inches (10 to 71 cm); brown (7.5YR 4/4) silty clay loam, dark brown (7.5YR 3/4), moist; 30 percent clay; weak fine and medium subangular blocky structure; slightly hard, very friable, very sticky and very plastic; many very fine and fine and few medium and coarse roots; many very fine pores; common fine carbonate masses on surfaces along root channels; 2 percent gravel; violently effervescent; strongly alkaline, pH 8.6; gradual wavy boundary.

Ck2—28 to 70 inches (71 to 178 cm); brown (7.5YR 4/4) silt loam, dark brown (7.5YR 3/4), moist; 23 percent clay; weak fine and medium subangular blocky structure; soft, very friable, very sticky and very plastic; common very fine and fine and few medium roots; many very fine pores; common fine carbonate masses on surfaces along root channels; 2 percent gravel; violently effervescent; strongly alkaline, pH 8.6.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 18 to 30 percent

Rock fragments: 0 to 5 percent

Gypsum: 0 to 2 percent

Calcium carbonate equivalent: 1 to 7 percent

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Texture: fine sandy loam, silt loam, silty clay loam

Rock fragments: 2 to 10 percent

Effervescence: strong to violent

Reaction (pH): slightly alkaline (7.4 to 7.8)

Ck horizons

Hue: 7.5YR, 10YR

Value: 3 to 4, dry or moist

Soil Survey of San Carlos Indian Reservation, Arizona

Chroma: 3 to 4, dry or moist

Texture: silt loam, silty clay loam with strata of coarser or finer textures

Rock fragments: 0 to 5 percent

Effervescence: slight to violent

Reaction (pH): moderately alkaline to strongly alkaline (7.9 to 9.0)

Riverwash

Slope: 0 to 3 percent

Range in Characteristics

Riverwash consists of stratified sands, gravels, and cobbles from numerous sources. This material is part of a dynamic system of braided bars and channels. This material is not stable and is subject to shifting and sorting. It is usually dry but can be transformed into a temporary water course or a short-lived torrent after a heavy rain within the watershed. In very wet years, surface water can cover Riverwash for part of the year. Riverwash does not usually support vegetation because the material is constantly shifted and scoured.

5—Anthony-Gila complex, 0 to 3 percent slopes

Map Unit Setting

Landform(s): flood plains

Elevation: 2,500 to 3,600 feet (762 to 1,097 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 60 to 67 degrees F (15.6 to 19.4 degrees C)

Mean annual soil temperature: 62 to 69 degrees F (16.7 to 20.5 degrees C)

Frost-free period: 190 to 250 days

Major Land Resource Area: 41-Southeastern Arizona Basin and Range

Land Resource Unit: 41-2 Chihuahuan-Sonoran Desert Shrub Mix

Map Unit Composition

Anthony and similar soils: 45 percent

Gila and similar soils: 40 percent

Minor components: Queencreek soils occur on similar positions as Anthony soils.

Riverwash occurs in small drainageways.

Soil Properties and Qualities

Anthony soils

Taxonomic classification: Coarse-loamy, mixed, superactive, calcareous, thermic

Typic Torrifuvents

Geomorphic position: generally occurs on small alluvial fans and slightly lower benches adjacent to main channel

Parent material: mixed coarse-loamy alluvium

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Soil Survey of San Carlos Indian Reservation, Arizona

Physical cover

canopy plant cover: 35 percent

woody debris: 0 percent

bare soil: 60 percent

rock fragments

gravel: 5 percent

Drainage class: well drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Available water capacity total inches: 7.1 (high)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: rare

Runoff class: very low

Hydrologic group: A

Ecological site name: Sandy Wash 8-12" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R041XB213AZ

Present vegetation: mesquite, catclaw acacia, bush muhly, spike dropseed, annual grasses, desert willow, sand dropseed, white burrobrush

Land capability (irrigated): 3s

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 2,000 feet north and 1,900 feet west of southeast corner of Section 26, Township 5 S, Range 22 E

Geographic Coordinate System:

32° 58' 0.00" north, 110° 3' 45.00" west

AC—0 to 1 inch (0 to 3 cm); brown (10YR 5/3) loam, dark grayish brown (10YR 4/2), moist; 14 percent clay; moderate thick platy structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many fine and many medium pores; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.6; clear wavy boundary.

C1—1 to 10 inches (3 to 25 cm); brown (10YR 5/3) loam, dark grayish brown (10YR 4/2), moist; 14 percent clay; massive; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.4; gradual wavy boundary.

C2—10 to 42 inches (25 to 107 cm); brown (10YR 5/3) sandy loam, dark grayish brown (10YR 4/2), moist; 17 percent clay; massive; soft, very friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine and fine pores; 10 percent gravel and 4 percent cobble; strongly effervescent, 3 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; gradual wavy boundary.

C3—42 to 60 inches (107 to 152 cm); yellowish brown (10YR 5/4) sandy loam, dark grayish brown (10YR 4/2), moist; 9 percent clay; massive; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; many very fine and fine pores; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.4.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 18 percent

Rock fragments: 5 to 25 percent

Soil Survey of San Carlos Indian Reservation, Arizona

Gypsum: 0 to 2 percent

Calcium carbonate equivalent: 2 to 5 percent

Effervescence: none to strong

Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 9.0)

AC horizon

Hue: 7.5YR, 10YR

Value: 5 to 6 dry, 3 to 5 moist

Chroma: 2 or 3, dry or moist

Texture: fine sandy loam, sandy loam, loam

Rock fragments: 0 to 10 percent

C horizons

Hue: 7.5YR, 10YR

Value: 5 to 6 dry, 3 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: sandy loam, loam with strata of coarser or finer textures

Rock fragments: 5 to 35 percent

Electrical conductivity: 0 to 4 dS/m

Gila soils

Taxonomic classification: Coarse-loamy, mixed, superactive, calcareous, thermic

Typic Torrifuvents

Geomorphic position: generally occurs on slightly higher benches.

Parent material: mixed coarse-loamy alluvium

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

woody debris: 2 percent

bare soil: 53 percent

rock fragments

gravel: 5 percent

Drainage class: well drained

Ksat solum: 0.57 to 5.95 inches per hour (4.00 to 42.00 micrometers per second)

Available water capacity total inches: 6.9 (moderate)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: rare

Runoff class: low

Hydrologic group: B

Ecological site name: Limy Fan 8-12" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R041XB206AZ

Present vegetation: creosotebush, annual grasses

Land capability (irrigated): 3s

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 1,500 feet north and 2,000 feet west of southeast corner of Section 27, Township 5 S, Range 22 E

Geographic Coordinate System:

32° 57' 57.70" north, 110° 4' 31.70" west

A—0 to 1 inch (0 to 2 cm); brown (10YR 5/3) very fine sandy loam, very dark grayish brown (10YR 3/2), moist; 12 percent clay; moderate medium platy structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 7 percent gravel; noneffervescent; neutral, pH 7.2; clear smooth boundary.

C—1 to 31 inches (2 to 79 cm); yellowish brown (10YR 5/4) very fine sandy loam, dark grayish brown (10YR 4/2), moist; 12 percent clay; moderate medium platy structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine and common medium and coarse roots; many very fine and fine pores; 3 percent gravel; slightly effervescent; strongly alkaline, pH 8.6; clear wavy boundary.

2C1—31 to 40 inches (79 to 102 cm); brown (10YR 5/3) gravelly sandy loam, dark grayish brown (10YR 4/2), moist; 9 percent clay; moderate medium platy structure; loose, nonsticky and nonplastic; many very fine and fine roots; many fine and many medium pores; 25 percent gravel; noneffervescent; slightly alkaline, pH 7.8; clear wavy boundary.

2C2—40 to 60 inches (102 to 152 cm); pale brown (10YR 6/3) very gravelly coarse sandy loam, brown (10YR 4/3), moist; 4 percent clay; moderate medium platy structure; loose, nonsticky and nonplastic; common very fine and fine roots; many fine and many medium pores; 53 percent gravel and 3 percent cobble; noneffervescent; slightly alkaline, pH 7.4.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 18 percent

Rock fragments: 2 to 25 percent

Gypsum: 0 to 2 percent

Calcium carbonate equivalent: 0 to 10 percent

Effervescence: none to strong

Reaction (pH): neutral to strongly alkaline (6.6 to 9.0)

A horizon

Hue: 10YR

Value: 5 dry, 3 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: loam, very fine sandy loam, fine sandy loam, sandy loam

Organic matter: 0 to 1 percent

Rock fragments: 0 to 10 percent

C horizons

Hue: 10YR

Value: 4 to 6 dry, 3 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: very fine sandy loam, loam with strata of coarser or finer textures

Rock fragments: 0 to 35 percent

Electrical conductivity: 0 to 4 dS/m

2C horizons

Hue: 10YR

Value: 4 to 6, dry or moist

Chroma: 2 to 3, dry or moist

Texture: fine sandy loam, sandy loam, coarse sandy loam

Rock fragments: 0 to 60 percent

Electrical conductivity: 0 to 4 dS/m

6—Aquents and Ustifluvents soils and Water, 0 to 5 percent slopes

Map Unit Setting

Landform(s): flood plains

Elevation: 3,400 to 5,750 feet (1,036 to 1,753 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Stream Segment Properties and Qualities

Active flood plain width: 45 to 550 feet

Stream flow: intermittent

Flooding hazard: frequent; brief (2 to 7 days)

Flood month: December-February and July-September

Water table minimum depth: 0 to 14 inches

Water table kind: apparent

Water table present: year round

Bank entrenchment:

percent cut: 70

percent uncut: 30

vertical cut: 1 to 5 feet; averages 3 to 5 feet

Depositional bar features: dynamic system of braided bars and channels that relocate with each major flood event; height varies with the depth and velocity of flood water.

Meander pattern: irregular meander

Channel composition:

percent bedrock: 10

percent boulders: 1

percent stones: 10

percent cobbles: 20

percent gravel: 29

percent sand: 20

percent silt and clay: 10

Stability: dynamic system of braided components that aggrades and degrades seasonally.

Map Unit Composition

Aquents and similar soils

Ustifluvents and similar soils

Water

Soil Survey of San Carlos Indian Reservation, Arizona

Minor components: Haplustolls soils occur on higher benches. Riverwash occurs in the drainageways.

This is an undifferentiated map unit. These components are not consistently associated geographically. At least one component is present in every delineation, but each delineation can have any combination of the components. This map unit is not consistent over time. The components of this map unit consist of a dynamic system of braided bars and channels. The active stream dynamics will cause these components to shift locations. During severe rainfall events, the channel will cut and fill throughout its length.

Soil Properties and Qualities

Aquents soils

Taxonomic classification: Aquents

Geomorphic position: generally occurs on lower benches that border drainageways

Parent material: mixed loamy and gravelly alluvium

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 10 percent

Chemical crust

salt: 1 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 70 percent

woody debris: 0 percent

bare soil: 9 percent

rock fragments

gravel: 10 percent

Depth to restrictive feature(s): 10 to 50 inches to bedrock, lithic

Drainage class: poorly drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 1.5 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: frequent

Seasonal water table minimum depth: about 0 to 15 inches

Runoff class: medium

Hydrologic group: D

Ecological site name: Platanus wrightii-Populus fremontii/Muhlenbergia rigens

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F038XB228AZ

Present vegetation: Arizona sycamore, cottonwood, Arizona alder, velvet ash, Arizona black walnut, Gooding willow, canyon grape, perennial grasses

Land capability (non irrigated): 6w

Typical Profile

Location

Public Land Survey: 1,320 feet south and 2,000 feet west of northeast corner of Section 32, Township 4 S, Range 19 E

Geographic Coordinate System:

33° 2' 42.52" north, 110° 25' 17.21" west

C1—0 to 2 inches (0 to 5 cm); brown (10YR 5/3) stratified loam, very dark grayish brown (10YR 3/2), moist; 18 percent clay; massive; soft, very friable, slightly sticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 5 percent gravel; slightly effervescent; slightly alkaline, pH 7.8; clear wavy boundary.

C2—2 to 14 inches (5 to 36 cm); pale brown (10YR 6/3) stratified gravelly fine sandy loam, dark grayish brown (10YR 4/2), moist; 12 percent clay; massive; soft, very friable, slightly sticky and nonplastic; common very fine and fine roots; many very fine and fine pores; 1 percent masses of oxidized iron lining pores; 20 percent gravel and 10 percent cobble; slightly effervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

R—14 to 60 inches (36 to 152 cm); igneous bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 8 to 18 percent

Rock fragments: 10 to 50 percent

Effervescence: slight to strong

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

C horizons

Hue: 7.5YR, 10YR

Value: 3 to 6 dry, 2 to 5 moist

Chroma: 2 to 5 dry or moist

Texture: loam, fine sandy loam with strata of coarser or finer textures

Rock fragments: 3 to 50 percent

R horizon

Tertiary igneous bedrock

Ustifluvents soils

Taxonomic classification: Ustifluvents

Geomorphic position: generally occurs on slightly higher benches next to Aqueuts

Parent material: mixed stratified loamy to sandy and gravelly alluvium

Slope: 0 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 2 percent

Chemical crust

salt: 1 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 55 percent

woody debris: 2 percent

bare soil: 0 percent

Soil Survey of San Carlos Indian Reservation, Arizona

rock fragments
gravel: 35 percent
cobble: 50 percent
stone: 5 percent

Drainage class: well drained

Ksat solum: 1.98 to 39.69 inches per hour (14.00 to 280.00 micrometers per second)

Available water capacity total inches: 2.2 (very low)

Shrink-swell potential: about 1.0 LEP (low)

Flooding hazard: frequent

Runoff class: very low

Hydrologic group: A

Ecological site name: Platanus wrightii-Populus fremontii/Muhlenbergia rigens

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F038XB228AZ

Present vegetation: Arizona sycamore, cottonwood, Arizona alder, velvet ash, Arizona black walnut, Gooding willow, canyon grape, perennial grasses

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,800 feet south and 900 feet west of northeast corner of Section 32, Township 4 S, Range 19 E

Geographic Coordinate System:

33° 2' 37.86" north, 110° 25' 4.31" west

C1—0 to 25 inches (0 to 64 cm); brown (7.5YR 4/3) stratified extremely cobbly loamy coarse sand, dark brown (7.5YR 3/3), moist; 10 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine pores; 35 percent gravel and 25 percent cobble and 10 percent stone; strongly effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

C2—25 to 45 inches (64 to 114 cm); brown (7.5YR 4/3) stratified very gravelly sandy loam, dark brown (7.5YR 3/2), moist; 12 percent clay; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; many very fine and fine pores; 40 percent gravel and 5 percent cobble and 5 percent stone; slightly effervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

C3—45 to 60 inches (114 to 152 cm); brown (7.5YR 5/3) stratified extremely cobbly coarse sand, brown (7.5YR 5/3), moist; 4 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine pores; 40 percent gravel and 30 percent cobble and 15 percent stone; slightly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 8 to 25 percent

Rock fragments: 40 to 90 percent

Effervescence: slight to strong

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

C horizons

Hue: 7.5YR, 10YR

Soil Survey of San Carlos Indian Reservation, Arizona

Value: 3 to 6 dry, 2 to 5 moist

Chroma: 2 to 5 dry or moist

Texture: sandy clay loam, sandy loam, loamy coarse sand, coarse sand with strata of coarser or finer textures

Rock fragments: 40 to 90 percent

R horizon

Tertiary igneous bedrock.

Water

Range in Characteristics

Water includes the perennial sections of streams such as Hawk Canyon Creek.

7—Argic Petrocalcids-Rock outcrop-Torriorthents complex, 2 to 60 percent slopes

Map Unit Setting

Landform(s): hills

Elevation: 3,000 to 5,000 feet (914 to 1,524 meters)

Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)

Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)

Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)

Frost-free period: 180 to 230 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-1 Lower Interior Chaparral

Map Unit Composition

Argic Petrocalcids and similar soils: 40 percent

Rock outcrop: 25 percent

Torriorthents and similar soils: 20 percent

Minor components: Lampshire soils occur on shallow sites over andesite. Eskiminzin soils occur on shallow sites over basalt. Sontag soils occur on small stable areas with less than 10 percent slope.

Soil Properties and Qualities

Argic Petrocalcids soils

Taxonomic classification: Argic Petrocalcids

Geomorphic position: generally occurs on back slopes and foot slopes below outcroppings of basalt

Parent material: colluvium derived from volcanic rock

Slope: 2 to 60 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 60 percent

woody debris: 1 percent

Soil Survey of San Carlos Indian Reservation, Arizona

bare soil: 12 percent
rock fragments
 fine gravel: 10 percent
 medium gravel: 10 percent
 coarse gravel: 15 percent
 cobble: 30 percent
 stone: 7 percent
 boulder: 3 percent
Depth to restrictive feature(s): 5 to 19 inches to petrocalcic; 15 to 22 inches to bedrock, paralithic; 20 to 32 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)
Ksat restrictive layer: 0.00 to 19.98 inches per hour (0.00 to 141.00 micrometers per second)
Available water capacity total inches: 1.5 (very low)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Basalt / Sandstone Hills 12-16" p.z.
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.
Ecological site number: R038XA118AZ
Present vegetation: black grama, jojoba, perennial forbs, threeawn, ephedra, annual grasses, banana yucca, bush muhly, canotia, flattop buckwheat, pricklypear, sideoats grama
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,100 feet north and 1,000 feet east of southwest corner of Section 30, Township 1 S, Range 20 E

Geographic Coordinate System:

33° 18' 46.10" north, 110° 20' 35.80" west

A—0 to 2 inches (0 to 5 cm); brown (10YR 4/3) very gravelly loam, dark brown (10YR 3/3), moist; 25 percent clay; moderate very fine and fine subangular blocky parting to strong very fine and fine granular structure; soft, loose, slightly sticky and slightly plastic; many very fine roots; many very fine pores; 35 percent gravel and 5 percent cobble; noneffervescent; slightly alkaline, pH 7.6; abrupt wavy boundary.

Btk—2 to 15 inches (5 to 38 cm); dark yellowish brown (10YR 4/4) very gravelly clay loam, brown (10YR 4/3), moist; 35 percent clay; moderate medium and coarse subangular blocky structure; slightly hard, very firm, moderately sticky and moderately plastic; many very fine and fine roots; many very fine pores; few faint clay films on faces of peds and few faint clay bridges between sand grains; many prominent carbonate coats on rock fragments; 35 percent gravel and 10 percent cobble and 10 percent stone; slightly effervescent; moderately alkaline, pH 8.0; very abrupt wavy boundary.

Bkm—15 to 18 inches (38 to 46 cm); cemented material, petrocalcic.

Cr—18 to 28 inches (46 to 71 cm); weathered andesite bedrock.

R—28 to 60 inches (71 to 152 cm); andesite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 27 to 40 percent

Rock fragments: 35 to 50 percent

Calcium carbonate equivalent: 10 to 25 percent

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 3 to 4 dry, 2 to 4 moist

Texture: loam, clay loam, sandy loam

Rock fragments: 10 to 50 percent

Effervescence: none to violent

Reaction (pH): neutral to strongly alkaline (6.6 to 9.0)

Btk horizons

Hue: 7.5YR, 10YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 2 to 4, dry or moist

Texture: clay, clay loam, loam

Rock fragments: 35 to 50 percent

Effervescence: slight to violent

Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 9.0)

Bkm horizon

Depth to petrocalcic: 4 to 24 inches

Thickness of petrocalcic: 1 to 15 inches

Indurated and fractured petrocalcic

Cr and R horizons

Bedrock is soft or hard basalt or andesite

Rock outcrop

Slope: 10 to 60 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as ledges and nearly vertical cliffs of interbedded Pliocene and Pleistocene lacustrine limestone, claystone, and basalt flows. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock but some are soft.

Torriorthents soils

Taxonomic classification: Torriorthents

Geomorphic position: generally occurs on summits and back slopes of limestone and claystone outcroppings

Parent material: Pliocene and Pleistocene age limestone and/or claystone

Slope: 2 to 30 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 25 percent

Soil Survey of San Carlos Indian Reservation, Arizona

woody debris: 10 percent
bare soil: 10 percent
rock fragments
fine gravel: 15 percent
medium gravel: 20 percent
coarse gravel: 20 percent
cobble: 5 percent

Depth to restrictive feature(s): 21 to 50 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 7.4 (high)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: Basalt / Sandstone Hills 12-16" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA118AZ

Present vegetation: canotia, black grama, threeawn, whitethorn, annual grasses, flattop buckwheat, jojoba, perennial forbs, sideoats grama, snakeweed

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,200 feet north and 650 feet east of southwest corner of Section 30, Township 1 S, Range 20 E

Geographic Coordinate System:

33° 18' 47.90" north, 110° 20' 39.50" west

AC—0 to 3 inches (0 to 8 cm); pale brown (10YR 6/3) loam, brown (10YR 4/3), moist; 15 percent clay; weak thin platy parting to weak fine granular structure; soft, loose, moderately sticky and moderately plastic; many very fine and fine roots; many very fine and fine pores; few distinct carbonate coats on faces of peds and rock fragments; 10 percent gravel; violently effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

C1—3 to 7 inches (8 to 18 cm); light gray (10YR 7/2) loam, brown (7.5YR 5/4), moist; 15 percent clay; strong fine and medium subangular blocky and moderate medium platy structure; moderately hard, friable, moderately sticky and moderately plastic; common very fine and fine roots between peds and few medium roots between peds; many very fine pores; few prominent carbonate coats on faces of peds and rock fragments; 10 percent very dark gray (N 3/), manganese coatings on surfaces along root channels and 10 percent very dark gray (N 3/), manganese coatings on faces of peds; violently effervescent, 35 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear wavy boundary.

C2—7 to 20 inches (18 to 51 cm); very pale brown (10YR 7/3) loam, brown (7.5YR 5/4), moist; 15 percent clay; strong fine and medium angular blocky structure; moderately hard, very friable, moderately sticky and moderately plastic; common very fine and fine roots; many very fine and fine pores; very many prominent carbonate coats on faces of peds; 2 percent very dark gray (N 3/), manganese coatings on faces of peds and 5 percent very dark gray (N 3/), manganese coatings on surfaces

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along root channels; violently effervescent; moderately alkaline, pH 8.2; gradual wavy boundary.

C3—20 to 46 inches (51 to 117 cm); very pale brown (10YR 7/3) loam, brown (7.5YR 5/4), moist; 15 percent clay; strong medium and coarse subangular blocky structure; extremely hard, very friable, moderately sticky and moderately plastic; very few distinct carbonate coats on faces of peds; 2 percent very dark gray (N 3/), manganese coatings on faces of peds; violently effervescent; moderately alkaline, pH 8.2.

R—46 to 60 inches (117 to 152 cm); dense lacustrine limestone bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 10 to 25 percent

Rock fragments: 0 to 20 percent

Calcium carbonate equivalent: 15 to 35 percent

AC horizon

Hue: 7.5YR, 10YR

Value: 4 to 7 dry, 3 to 5 moist

Chroma: 2 to 4, dry or moist

Texture: loam

Rock fragments: 10 to 30 percent

Effervescence: strong to violent

Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 9.0)

C horizons

Hue: 7.5YR, 10YR

Value: 4 to 7 dry, 3 to 6 moist

Chroma: 2 to 4 dry, 3 to 4 moist

Texture: loam

Rock fragments: 0 to 30 percent

Effervescence: violent

Reaction (pH): moderately alkaline to strongly alkaline (7.9 to 9.0)

R horizon

Bedrock is lacustrine limestone

8—Ashcreek-Stanford-Lanque association, 0 to 3 percent slopes

Map Unit Setting

Landform(s): flood plains

Elevation: 4,200 to 5,800 feet (1,280 to 1,768 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Ashcreek and similar soils: 45 percent

Stanford and similar soils: 35 percent

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Lanque and similar soils: 15 percent

Minor components: Cloverdale soils occur on slightly higher stream terraces. Rafter soils and Riverwash occur in drainageways.

Soil Properties and Qualities

Ashcreek soils

Taxonomic classification: Fine, smectitic, thermic Torrertic Haplustolls

Geomorphic position: generally occurs on benches that border drainageways along lower portions of drainages

Parent material: mixed alluvium

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 0 percent

bare soil: 65 percent

rock fragments

fine gravel: 1 percent

medium gravel: 2 percent

coarse gravel: 2 percent

Drainage class: well drained

Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)

Available water capacity total inches: 9.3 (high)

Shrink-swell potential: about 10.0 LEP (very high)

Flooding hazard: occasional

Runoff class: low

Hydrologic group: D

Ecological site name: Clayey Upland 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB202AZ

Present vegetation: tobosa, vine mesquite, blue grama, sideoats grama, western wheatgrass, annual grasses, creeping muhly, mat muhly, perennial forbs

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,000 feet north and 1,900 feet west of southeast corner of Section 30, Township 2 S, Range 25 E

Geographic Coordinate System:

33° 13' 27.88" north, 109° 49' 5.97" west

A1—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/3) silty clay loam, dark brown (7.5YR 3/2), moist; 32 percent clay; strong thick platy structure; soft, very friable, very sticky and very plastic; many very fine and fine roots; many very fine and fine pores; 1 percent gravel; noneffervescent; neutral, pH 7.0; abrupt wavy boundary.

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A2—2 to 9 inches (5 to 23 cm); brown (7.5YR 4/3) silty clay loam, dark brown (7.5YR 3/2), moist; 32 percent clay; moderate thick platy parting to strong fine and medium subangular blocky structure; slightly hard, friable, very sticky and very plastic; many very fine and fine roots; many very fine and fine pores; 1 percent gravel; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bw1—9 to 32 inches (23 to 81 cm); brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2), moist; 53 percent clay; strong medium and coarse angular blocky structure; very hard, very firm, very sticky and very plastic; many very fine and fine and few medium roots; common very fine and fine pores; few distinct pressure faces; 1 percent gravel; noneffervescent; slightly alkaline, pH 7.6; diffuse wavy boundary.

Bw2—32 to 60 inches (81 to 152 cm); brown (7.5YR 5/2) clay, dark brown (7.5YR 3/2), moist; 55 percent clay; weak medium and coarse angular blocky structure; very hard, very firm, very sticky and very plastic; common very fine and fine roots; common very fine pores; common distinct pressure faces; 1 percent gravel; noneffervescent; slightly alkaline, pH 7.6.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 55 percent

Rock fragments: 0 to 20 percent

Cracks:

Width: 0.2 to 1 inch

Depth: surface to 25 inches

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

A horizons

Hue: 7.5YR, 10YR

Value: 4 to 6 dry, 2 to 3 moist

Chroma: 2 to 4 dry, 1 to 3 moist

Texture: clay, silty clay, clay loam, silty clay loam

Rock fragments: 0 to 5 percent

Effervescence: none

Bw horizons

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3 dry, 1 to 3 moist

Texture: clay, silty clay, clay loam, silty clay loam

Rock fragments: 0 to 20 percent

Effervescence: none to strong

Stanford soils

Taxonomic classification: Fine-loamy, mixed, superactive, thermic Cumulic
Haplustolls

Geomorphic position: generally occurs on benches that border drainageways,
upstream from Ashcreek soils

Parent material: mixed alluvium

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Soil Survey of San Carlos Indian Reservation, Arizona

Chemical crust
 salt: 0 percent
 gypsum: 0 percent
Physical cover
 canopy plant cover: 30 percent
 woody debris: 0 percent
 bare soil: 50 percent
 rock fragments
 fine gravel: 10 percent
 medium gravel: 10 percent
 coarse gravel: 5 percent
Drainage class: well drained
Ksat solum: 0.57 to 5.95 inches per hour (4.00 to 42.00 micrometers per second)
Available water capacity total inches: 10.3 (very high)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: rare
Runoff class: low
Hydrologic group: B
Ecological site name: Loamy Upland 16-20" p.z.
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.
Ecological site number: R038XB209AZ
Present vegetation: blue grama, sideoats grama, prairie junegrass, vine mesquite, annual grasses, bottlebrush squirreltail, creeping muhly, mat muhly, perennial forbs, threeawn, tobosa
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,500 feet north and 1,000 feet west of southeast corner of Section 32, Township 2 S, Range 25 E

Geographic Coordinate System:

33° 12' 56.67" north, 109° 47' 54.02" west

A—0 to 8 inches (0 to 20 cm); dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2), moist; 12 percent clay; moderate very thin platy and moderate fine and medium subangular blocky parting to moderate fine granular structure; slightly hard, very friable, slightly sticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 15 percent gravel; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

Bw/C—8 to 19 inches (20 to 48 cm); dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2), moist; 17 percent clay; moderate fine and medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; common very fine and fine roots; many very fine and fine pores; 15 percent gravel; noneffervescent; slightly alkaline, pH 7.4; clear wavy boundary.

C/B—19 to 42 inches (48 to 107 cm); dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2), moist; 25 percent clay; weak very fine and fine subangular blocky parting to weak fine granular structure; loose, slightly sticky and slightly plastic; common very fine and fine roots; many very fine and fine pores; 10 percent gravel; noneffervescent; slightly alkaline, pH 7.8; clear wavy boundary.

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Bwb—42 to 66 inches (107 to 168 cm); brown (10YR 4/3) loam, very dark brown (10YR 2/2), moist; 19 percent clay; moderate fine and medium subangular blocky structure; very hard, very firm, moderately sticky and moderately plastic; common very fine and fine roots; many very fine and fine pores; 10 percent gravel; noneffervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 18 to 35 percent

Rock fragments: 0 to 20 percent

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3 dry or moist

Texture: sandy loam, silt loam, loam, silty clay loam

Rock fragments: 0 to 20 percent

Effervescence: none

Reaction (pH): neutral (6.6 to 7.3)

Bw/C horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: silt loam, loam, silty clay loam

Rock fragments: 0 to 20 percent

Effervescence: none to slight

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

C/B horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 4 dry, 2 to 3 moist

Texture: sandy loam, silt loam, loam, silty clay loam, clay loam

Rock fragments: 0 to 20 percent

Effervescence: none to slight

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

Bwb horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 4 moist

Chroma: 2 to 4 dry, 2 to 3 moist

Texture: silt loam, loam, clay loam

Rock fragments: 0 to 20 percent

Effervescence: none to slight

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

Lanque soils

Taxonomic classification: Coarse-loamy, mixed, superactive, thermic Pachic
Haplustolls

Geomorphic position: generally occurs on benches that border drainageways,
upstream from Stanford soils

Parent material: mixed alluvium

Slope: 0 to 3 percent

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Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

woody debris: 0 percent

bare soil: 30 percent

rock fragments

fine gravel: 20 percent

medium gravel: 20 percent

coarse gravel: 5 percent

Drainage class: well drained

Ksat solum: 1.98 to 39.69 inches per hour (14.00 to 280.00 micrometers per second)

Available water capacity total inches: 3.4 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: rare

Runoff class: very low

Hydrologic group: A

Ecological site name: Loamy Upland 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB209AZ

Present vegetation: blue grama, sideoats grama, cane beardgrass, green sprangletop, prairie junegrass, Arizona cottontop, annual grasses, bottlebrush squirreltail, creeping muhly, perennial forbs, threeawn, vine mesquite

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 700 feet north and 400 feet west of southeast corner of Section 35, Township 2 S, Range 24 E

Geographic Coordinate System:

33° 12' 35.00" north, 109° 50' 50.90" west

A—0 to 2 inches (0 to 5 cm); dark grayish brown (10YR 4/2) gravelly sandy loam, dark brown (7.5YR 3/3), moist; 5 percent clay; moderate medium platy parting to moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine and fine pores; 25 percent gravel; noneffervescent; neutral, pH 7.2; gradual wavy boundary.

C1—2 to 8 inches (5 to 20 cm); dark grayish brown (10YR 4/2) gravelly loam, dark brown (7.5YR 3/2), moist; 15 percent clay; weak thick platy and moderate medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and few medium roots; many very fine and few medium pores; 15 percent gravel; noneffervescent; neutral, pH 7.2; gradual wavy boundary.

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C2—8 to 24 inches (20 to 61 cm); brown (7.5YR 4/2) gravelly sandy loam, dark brown (7.5YR 3/2), moist; 9 percent clay; weak medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine and common medium pores; 20 percent gravel; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

2C—24 to 60 inches (61 to 152 cm); brown (7.5YR 4/3) very gravelly coarse sand, dark brown (7.5YR 3/3), moist; 5 percent clay; massive; loose, nonsticky and nonplastic; many very fine roots; many very fine and common medium pores; 35 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 7.2.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 15 percent

Rock fragments: 5 to 35 percent

Effervescence: none

Reaction (pH): neutral (6.6 to 7.3)

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: loam, sandy loam

Rock fragments: 5 to 35 percent

C horizons

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 moist

Chroma: 2 to 4, dry or moist

Texture: loam, sandy loam, coarse sandy loam

Rock fragments: 5 to 35 percent

9—Beaumont-Rock outcrop-Cherrycow complex, 5 to 60 percent slopes

Map Unit Setting

Landform(s): hills, mountains

Elevation: 3,600 to 6,500 feet (1,097 to 1,981 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Beaumont and similar soils: 55 percent

Rock outcrop: 20 percent

Cherrycow and similar soils: 15 percent

Minor components: Soils that do not meet the requirements for a mollic epipedon occur on back slopes. Aridic Lithic Ustorthents soils occur on summits and convex back slopes. Kuykendall soils occur on shoulders and back slopes.

Soil Properties and Qualities

Beaumont soils

Taxonomic classification: Clayey-skeletal, smectitic, thermic Aridic Lithic Argiustolls

Geomorphic position: generally occurs on shoulders and back slopes

Parent material: clayey skeletal alluvium and/or residuum weathered from andesite and/or basalt

Slope: 5 to 60 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 45 percent

woody debris: 5 percent

bare soil: 10 percent

rock fragments

gravel: 55 percent

cobble: 15 percent

stone: 5 percent

Depth to restrictive feature(s): 4 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.06 to 1.98 inches per hour (0.42 to 14.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 0.9 (very low)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Clayey Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB215AZ

Present vegetation: singleleaf pinyon, juniper, mountain mahogany, perennial forbs, perennial grasses, silktassel, skunkbush sumac, turbinella oak

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,560 feet north and 1,250 feet east of southwest corner of Section 23, Township 4 S, Range 18 E

Geographic Coordinate System:

33° 4' 3.94" north, 110° 28' 46.76" west

A—0 to 3 inches (0 to 8 cm); brown (10YR 4/3) very gravelly loam, very dark grayish brown (10YR 3/2), moist; 22 percent clay; moderate fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine

Soil Survey of San Carlos Indian Reservation, Arizona

roots; many very fine and fine pores; 50 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 6.6; clear wavy boundary.

Bt—3 to 9 inches (8 to 23 cm); brown (7.5YR 4/3) very gravelly clay loam, dark brown (7.5YR 3/2), moist; 38 percent clay; moderate medium and coarse subangular blocky structure; hard, firm, very sticky and very plastic; common very fine and fine roots; many very fine and fine pores; many distinct clay films on faces of peds and rock fragments; 50 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 6.6; clear wavy boundary.

R—9 to 60 inches (23 to 152 cm); basalt bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 50 percent

Rock fragments: 35 to 75 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3 dry, 1 to 3 moist

Texture: loam, clay loam

Rock fragments: 35 to 75 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3 dry, 1 to 3 moist

Texture: clay loam, clay

Rock fragments: 35 to 75 percent

R horizon

Bedrock is andesite or basalt

Rock outcrop

Slope: 5 to 60 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops and ledges of Tertiary volcanic rocks. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

Cherrycow soils

Taxonomic classification: Fine, smectitic, thermic Aridic Argiustolls

Geomorphic position: generally occurs on summits and less sloping back slopes

Parent material: clayey alluvium and/or residuum weathered from andesite and/or basalt

Slope: 5 to 35 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

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Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover: 60 percent
woody debris: 5 percent
bare soil: 5 percent
rock fragments
gravel: 20 percent
cobble: 10 percent
Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 3.4 (low)
Shrink-swell potential: about 10.0 LEP (very high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Clay Loam Upland 16-20" p.z.
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.
Ecological site number: R038XB203AZ
Present vegetation: singleleaf pinyon, juniper, mountain mahogany, perennial forbs, perennial grasses, silktassel, skunkbush sumac, turbinella oak
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 650 feet south and 2,600 feet west of northeast corner of Section 23, Township 4 S, Range 18 E

Geographic Coordinate System:

33° 4' 30.28" north, 110° 28' 25.63" west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/2) gravelly clay loam, dark brown (7.5YR 3/2), moist; 35 percent clay; strong medium and coarse granular structure; slightly hard, very friable, very sticky and very plastic; many very fine and fine roots; many very fine and fine and common medium pores; 20 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 7.2; gradual wavy boundary.

Bt1—2 to 10 inches (5 to 25 cm); brown (7.5YR 4/3) cobbly clay, dark brown (7.5YR 3/3), moist; 58 percent clay; strong fine and medium subangular blocky structure; very hard, firm, very sticky and very plastic; many very fine and fine roots; many very fine and fine pores; very many distinct clay films on faces of peds and rock fragments; 10 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 7.2; gradual wavy boundary.

Bt2—10 to 30 inches (25 to 76 cm); brown (7.5YR 4/3) gravelly clay, dark brown (7.5YR 3/3), moist; 58 percent clay; strong medium and coarse angular blocky structure; very hard, very firm, very sticky and very plastic; common very fine and fine roots; common very fine and fine pores; many distinct clay films on faces of peds and

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rock fragments; 10 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

R—30 to 60 inches (76 to 152 cm); basalt bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 45 to 60 percent

Rock fragments: 10 to 30 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

A horizon

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: clay loam, clay

Rock fragments: 10 to 50 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay

Rock fragments: 5 to 30 percent

R horizon

Bedrock is andesite or basalt

10—Bigtoe-Ryallen-Tombstone complex, 3 to 30 percent slopes

Map Unit Setting

Landform(s): fan terraces

Elevation: 3,000 to 4,500 feet (914 to 1,372 meters)

Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)

Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)

Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)

Frost-free period: 180 to 230 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-1 Lower Interior Chaparral

Map Unit Composition

Bigtoe and similar soils: 40 percent

Ryallen and similar soils: 35 percent

Tombstone and similar soils: 15 percent

Minor components: Eloma soils occur on stable summits. Pedregosa soils occur on similar positions as Bigtoe. Riverwash and Bodecker soils occur in drainageways.

Soil Properties and Qualities

Bigtoe soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic, shallow Ustic Haplodurids

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Geomorphic position: generally occurs on summits and upper back slopes

Parent material: mixed gravelly alluvium

Slope: 3 to 20 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 2 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 48 percent

woody debris: 0 percent

bare soil: 10 percent

rock fragments

gravel: 70 percent

Depth to restrictive feature(s): 5 to 20 inches to duripan

Drainage class: well drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 1.2 (very low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: high

Hydrologic group: D

Ecological site name: Limy Upland 12-16" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA106AZ

Present vegetation: creosotebush, whitethorn, annual grasses, black grama, bush muhly

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,775 feet east and 1,850 feet south of northwest corner of Section 5, Township 5 S, Range 22 E

Geographic Coordinate System:

33° 1' 46.41" north, 110° 6' 54.46" west

A—0 to 1 inch (0 to 3 cm); brown (10YR 5/3) gravelly sandy loam, dark brown (10YR 3/3), moist; 14 percent clay; moderate fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine pores; 25 percent gravel; violently effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Bk1—1 to 5 inches (3 to 13 cm); pale brown (10YR 6/3) very gravelly sandy clay loam, dark brown (10YR 3/3), moist; 24 percent clay; moderate fine and medium subangular blocky structure; soft, very friable, moderately sticky and moderately plastic; many very fine and fine and few medium roots; many very fine and fine pores; common coarse carbonate masses and common carbonate coats on bottom of rock

Soil Survey of San Carlos Indian Reservation, Arizona

fragments; 43 percent gravel and 7 percent cobble; violently effervescent; 24 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; clear wavy boundary.

Bk2—5 to 17 inches (13 to 43 cm); 10 percent white (10YR 8/1) and 90 percent light gray (10YR 7/2) very gravelly sandy loam, brown (10YR 5/3), moist; 14 percent clay; massive; soft, very friable, slightly sticky and nonplastic; many very fine and fine and few medium roots; many very fine and fine pores; many extremely coarse carbonate concretions; 43 percent gravel and 7 percent cobble; violently effervescent; 31 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; abrupt wavy boundary.

Bkqm—17 to 60 inches (43 to 152 cm); silica and carbonate cemented material, duripan.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 15 to 27 percent

Rock fragments: 35 to 75 percent

Depth to calcic: 1 to 10 inches

Calcium carbonate equivalent: 5 to 45 percent

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 2 to 4, dry or moist

Texture: sandy loam

Rock fragments: 20 to 35 percent

Effervescence: none to violent

Bk horizon

Hue: 7.5YR, 10YR

Value: 5 to 8 dry, 3 to 5 moist

Chroma: 2 to 4, dry or moist

Texture: sandy loam, sandy clay loam

Rock fragments: 35 to 75 percent

Effervescence: very slight to violent

Bkqm horizon

Indurated and occasionally fractured duripan

Thickness: 3 to 18 inches

Ryallen soils

Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic Ustic

Calciargids

Geomorphic position: generally occurs on shoulder slopes and back slopes

Parent material: mixed gravelly alluvium

Slope: 3 to 20 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 1 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Soil Survey of San Carlos Indian Reservation, Arizona

Physical cover

canopy plant cover: 50 percent

woody debris: 1 percent

bare soil: 18 percent

rock fragments

gravel: 33 percent

Drainage class: well drained

Ksat solum: 0.06 to 5.95 inches per hour (0.42 to 42.00 micrometers per second)

Available water capacity total inches: 3.3 (low)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: medium

Hydrologic group: C

Ecological site name: Clayey Slopes 12-16" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA108AZ

Present vegetation: tobosa, sideoats grama, false mesquite, ephedra, annual grasses, curly mesquite, jojoba, perennial forbs, snakeweed

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,300 feet east and 2,200 feet south of northwest corner of Section 5, Township 5 S, Range 22 E

Geographic Coordinate System:

33° 1' 43.08" north, 110° 6' 47.29" west

A—0 to 1 inch (0 to 2 cm); yellowish brown (10YR 5/4) gravelly sandy loam, dark brown (10YR 3/3), moist; 17 percent clay; moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine pores; 30 percent gravel; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt1—1 to 4 inches (2 to 10 cm); brown (7.5YR 4/4) very gravelly sandy clay, brown (7.5YR 4/3), moist; 37 percent clay; strong medium and coarse subangular blocky structure; hard, friable, moderately sticky and moderately plastic; many very fine and fine and few medium roots; many very fine and fine pores; common distinct clay films on faces of peds and rock fragments and few distinct clay bridges between sand grains; 45 percent gravel; noneffervescent; slightly alkaline, pH 7.6; gradual wavy boundary.

Bt2—4 to 11 inches (10 to 28 cm); yellowish red (5YR 4/6) very gravelly sandy clay, reddish brown (5YR 4/4), moist; 37 percent clay; moderate fine and medium subangular blocky structure; hard, friable, moderately sticky and moderately plastic; many very fine and fine and few medium roots; many fine and many medium pores; common prominent clay films on faces of peds and rock fragments and few distinct clay bridges between sand grains; 55 percent gravel; noneffervescent; slightly alkaline, pH 7.8; clear irregular boundary.

Btk1—11 to 22 inches (28 to 56 cm); yellowish red (5YR 4/6) extremely gravelly sandy clay loam, reddish brown (5YR 4/4), moist; 34 percent clay; moderate fine and medium subangular blocky structure; hard, friable, moderately sticky and moderately plastic; many very fine and fine roots; many fine and many medium pores; common

Soil Survey of San Carlos Indian Reservation, Arizona

distinct clay films on faces of peds and few distinct clay films on rock fragments; common coarse carbonate masses and nodules; 65 percent gravel and 5 percent cobble; violently effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

Btk2—22 to 30 inches (56 to 76 cm); yellowish red (5YR 5/6) very gravelly sandy loam, reddish brown (5YR 4/4), moist; 19 percent clay; weak fine and medium subangular blocky parting to single grain structure; loose, slightly sticky and nonplastic; few very fine roots; many very fine and fine pores; common distinct clay films on faces of peds and few distinct clay films on rock fragments; common coarse carbonate masses and nodules; 55 percent gravel; strongly effervescent; moderately alkaline, pH 8.0; gradual wavy boundary.

Btk3—30 to 60 inches (76 to 152 cm); strong brown (7.5YR 5/6) extremely gravelly sandy loam, strong brown (7.5YR 4/6), moist; 17 percent clay; single grain; slightly hard, slightly rigid, slightly sticky and nonplastic; common very fine and fine roots; many fine and many medium pores; few faint clay films on faces of peds and rock fragments; many carbonate concretions around rock fragments and common coarse carbonate masses and nodules; 65 percent gravel; violently effervescent; moderately alkaline, pH 8.4.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 55 percent

Rock fragments: 35 to 50 percent

Calcium carbonate equivalent: 0 to 25 percent

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Texture: sandy loam, sandy clay loam

Rock fragments: 25 to 35 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 4, dry or moist

Chroma: 3 to 6, dry or moist

Texture: sandy clay, clay loam, clay

Rock fragments: 35 to 60 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Btk horizons

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 4 to 5 moist

Chroma: 3 to 6, dry or moist

Texture: sandy loam, sandy clay loam, clay loam, clay

Rock fragments: 45 to 60 percent

Depth to calcic horizon: 15 to 30 inches

Effervescence: strong to violent

Reaction (pH): moderately alkaline (7.9 to 8.4)

Tombstone soils

Taxonomic classification: Sandy-skeletal, mixed, superactive, thermic Ustic

Haplocalcids

Soil Survey of San Carlos Indian Reservation, Arizona

Geomorphic position: generally occurs on back slopes and foot slopes

Parent material: mixed gravelly alluvium

Slope: 5 to 30 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 50 percent

 woody debris: 0 percent

 bare soil: 10 percent

 rock fragments

 gravel: 75 percent

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 1.6 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: Limy Slopes 12-16" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA126AZ

Present vegetation: black grama, whitethorn, blue threeawn, sideoats grama, ephedra, annual grasses, bush muhly, false mesquite, range ratany, slim tridens, snakeweed

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,550 feet east and 1,650 feet north of southwest corner of Section 31, Township 4 S, Range 22 E

Geographic Coordinate System:

33° 2' 22.79" north, 110° 8' 0.18" west

A—0 to 2 inches (0 to 5 cm); grayish brown (10YR 5/2) gravelly sandy loam, dark grayish brown (10YR 4/2), moist; 14 percent clay; weak very fine and fine subangular blocky and moderate medium platy structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 30 percent gravel; violently effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Bk1—2 to 7 inches (5 to 18 cm); brown (10YR 5/3) very gravelly sandy loam, brown (10YR 4/3), moist; 17 percent clay; moderate fine and medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine pores; common coarse carbonate nodules on bottom of rock fragments and common coarse carbonate masses; 50 percent gravel; violently effervescent; moderately alkaline, pH 8.2; gradual irregular boundary.

Bk2—7 to 24 inches (18 to 61 cm); light brownish gray (10YR 6/2) extremely gravelly loamy sand, grayish brown (10YR 5/2), moist; 7 percent clay; massive; slightly hard,

slightly rigid, nonsticky and nonplastic; many fine and common medium roots; many very fine and fine pores; many extremely coarse carbonate concretions; 65 percent gravel; violently effervescent; moderately alkaline, pH 8.4; gradual wavy boundary.

Bk3—24 to 60 inches (61 to 152 cm); light gray (10YR 7/2) extremely gravelly loamy sand, grayish brown (10YR 5/2), moist; 7 percent clay; massive; slightly hard, slightly rigid, nonsticky and nonplastic; few fine and medium roots; many very fine and fine pores; many extremely coarse carbonate concretions; 65 percent gravel and 15 percent cobble; violently effervescent; moderately alkaline, pH 8.4.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 15 percent

Rock fragments: 35 to 60 percent

Depth to calcic horizon: 1 to 15 inches

Calcium carbonate equivalent: 1 to 20 percent

A horizon

Hue: 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: sandy loam

Rock fragments: 25 to 30 percent

Effervescence: none to violent

Reaction (pH): neutral to strongly alkaline (6.6 to 9.0)

Bk horizons

Hue: 10YR

Value: 4 to 7, dry or moist

Chroma: 2 to 3, dry or moist

Texture: loamy sand, sandy loam, loam

Rock fragments: 50 to 75 percent

Effervescence: strong to violent

Reaction (pH): moderately alkaline to strongly alkaline (7.9 to 9.0)

Tombstone as used in this mapping unit is a taxadjunct to the series because it has a sandy-skeletal particle-size control section. Tombstone series is Loamy-skeletal, mixed, superactive, thermic Ustic Haplocalcids

11—Biplane family-Rock outcrop complex, 15 to 50 percent slopes

Map Unit Setting

Landform(s): hills, mountains

Elevation: 3,200 to 4,500 feet (975 to 1,372 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Biplane family and similar soils: 60 percent

Soil Survey of San Carlos Indian Reservation, Arizona

Rock outcrop: 15 percent

Minor components: Brunopeak and Yarbam soils occur on similar positions as
Biplane family soils. Hathaway family soils occur on lower back slopes.

Soil Properties and Qualities

Biplane family soils

Series and series family designations are naming expedients and equal.

Taxonomic classification: Fine, smectitic, thermic Torrertic Haplustalfs

Geomorphic position: generally occurs on shoulders and back slopes

Parent material: colluvium and/or residuum derived from intrusive igneous bodies and
shale interbedded with quartzite

Slope: 15 to 50 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 55 percent

woody debris: 5 percent

bare soil: 5 percent

rock fragments

gravel: 30 percent

cobble: 30 percent

stone: 10 percent

Depth to restrictive feature(s): 20 to 33 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per
second)

Available water capacity total inches: 4.7 (low)

Shrink-swell potential: about 10.0 LEP (very high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Loamy Upland 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between
delineations. Additional detailed site inventory is required for effective range and
forest management.

Ecological site number: R038XB209AZ

Present vegetation: sideoats grama, false mesquite, green sprangletop, hairy grama,
shrubby buckwheat, agave, cane beardgrass, juniper, perennial forbs, perennial
grasses, plains lovegrass, prairie junegrass, pricklypear

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 140 feet south and 1,270 feet east of northwest corner of
Section 1, Township 5 S, Range 18 E

Geographic Coordinate System:

33° 2' 2.15" north, 110° 27' 44.74" west

Soil Survey of San Carlos Indian Reservation, Arizona

A—0 to 1 inch (0 to 3 cm); brown (7.5YR 5/4) extremely cobbly sandy clay loam, brown (7.5YR 4/4), moist; 28 percent clay; moderate fine and medium granular structure; soft, very friable, moderately sticky and moderately plastic; many very fine and fine roots; many very fine and fine pores; 30 percent gravel and 30 percent cobble and 10 percent stone; noneffervescent; slightly alkaline, pH 7.4; clear wavy boundary.

Bt—1 to 27 inches (3 to 69 cm); reddish brown (5YR 4/4) clay, reddish brown (5YR 4/4), moist; 55 percent clay; strong medium and coarse angular blocky structure; very hard, extremely firm, very sticky and very plastic; many very fine and fine roots; common very fine and medium pores; common distinct pressure faces; many distinct clay films on faces of peds and rock fragments; 5 percent gravel; very slightly effervescent; slightly alkaline, pH 7.6; gradual wavy boundary.

2Bt—27 to 32 inches (69 to 81 cm); brown (7.5YR 5/4) clay, brown (7.5YR 5/3), moist; 55 percent clay; strong medium and coarse angular blocky structure; very hard, extremely firm, very sticky and very plastic; common very fine roots; common very fine pores; few distinct pressure faces; many distinct clay films on faces of peds and rock fragments; 5 percent gravel; slightly effervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

2R—32 to 60 inches (81 to 152 cm); quartzite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 40 to 60 percent

Rock fragments: 5 to 30

Effervescence: none to violent

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 3 to 4 dry, 3 to 6 moist

Texture: loam, sandy loam, sandy clay loam, clay loam, clay

Rock fragments: 20 to 70 percent

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

Bt horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 5 moist

Chroma: 3 to 6, dry and moist

Texture: clay loam, clay

Rock fragments: 5 to 30 percent

Reaction (pH): neutral to strongly alkaline (6.6 to 9.0)

R horizon

Bedrock quartzite

Rock outcrop

Slope: 15 to 50 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops and ledges of quartzite and intrusive igneous rocks. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

12—Bodecker soils and Riverwash, 0 to 5 percent slopes

Map Unit Setting

Landform(s): flood plains

Elevation: 3,000 to 4,500 feet (914 to 1,372 meters)

Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)

Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)

Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)

Frost-free period: 180 to 230 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-1 Lower Interior Chaparral

Map Unit Composition

Bodecker and similar soils

Riverwash

Minor components: Combate and Ubik soils occur on slightly higher benches.

This is an undifferentiated map unit. These components are not consistently associated geographically. At least one component is present in every delineation, but each delineation can have any combination of the components. This map unit is not consistent over time. The components of this map unit consist of a dynamic system of braided bars and channels. The active stream dynamics will cause these components to shift locations. During severe rainfall events, the channel will cut and fill throughout its length.

Soil Properties and Qualities

Bodecker soils

Taxonomic classification: Sandy-skeletal, mixed, thermic Ustic Torriorthents

Geomorphic position: occurs on lower benches

Parent material: mixed sandy and gravelly alluvium

Slope: 0 to 5 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 30 percent

 woody debris: 0 percent

 bare soil: 20 percent

 rock fragments

 gravel: 30 percent

 cobble: 20 percent

 stone: 10 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 39.69 inches per hour (14.00 to 280.00 micrometers per second)

Available water capacity total inches: 1.3 (very low)

Soil Survey of San Carlos Indian Reservation, Arizona

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: frequent

Runoff class: very low

Hydrologic group: A

Ecological site name: Sandy Bottom 12-16" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA111AZ

Present vegetation: annual grasses, catclaw acacia, bush muhly, purple threeawn, burroweed, singlewhorl burrobush, velvet mesquite

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 970 feet south and 1,300 feet west of northeast corner of Section 19, Township 1 N, Range 16 E

Geographic Coordinate System:

33° 25' 11.00" north, 110° 42' 32.30" west

C1—0 to 7 inches (0 to 18 cm); brown (7.5YR 5/4) very stony fine sandy loam, brown (7.5YR 4/4), moist; 10 percent clay; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine and many medium and coarse pores; 15 percent gravel and 10 percent cobble and 10 percent stone; strongly effervescent; slightly alkaline, pH 7.8; gradual wavy boundary.

C2—7 to 34 inches (18 to 86 cm); brown (7.5YR 4/3) stratified extremely cobbly loamy sand, dark brown (7.5YR 3/3), moist; 5 percent clay; weak coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine and medium roots; many very fine and fine and many medium and coarse pores; 30 percent gravel and 30 percent cobble and 10 percent stone; very slightly effervescent; slightly alkaline, pH 7.6; gradual wavy boundary.

C3—34 to 60 inches (86 to 152 cm); brown (7.5YR 5/3) stratified extremely cobbly coarse sand, brown (7.5YR 4/3), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few medium and coarse roots; common very fine and fine and many medium and coarse pores; 40 percent gravel and 30 percent cobble and 10 percent stone; noneffervescent; neutral, pH 7.2.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: less than 10 percent

Rock fragments: 35 to 75 percent

Effervescence: none to violent

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

A or C1 horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Texture: loamy sand, sandy loam, fine sandy loam

Rock fragments: 20 to 50 percent

Lower C horizons

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist
Chroma: 2 to 4, dry or moist
Texture: stratified coarse sand to fine sandy loam
Rock fragments: 30 to 80 percent

Riverwash

Slope: 0 to 5 percent

Range in Characteristics

Riverwash consists of stratified sands, gravels, and cobbles from numerous sources. This material is part of a dynamic system of braided bars and channels. This material is not stable and is subject to shifting and sorting. It is usually dry but can be transformed into a temporary water course or a short-lived torrent after a heavy rain within the watershed. In very wet years, surface water can cover Riverwash for part of the year. Riverwash does not usually support vegetation because the material is constantly shifted and scoured.

13—Brewster-Rock outcrop-Woodcutter complex, 10 to 60 percent slopes

Map Unit Setting

Landform(s): mountains
Elevation: 4,000 to 6,200 feet (1,219 to 1,889 meters)
Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)
Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)
Frost-free period: 160 to 210 days
Major Land Resource Area: 38-Mogollon Transition
Land Resource Unit: 38-2 Interior chaparral-Woodlands

Map Unit Composition

Brewster and similar soils: 40 percent
Rock outcrop: 30 percent
Woodcutter and similar soils: 20 percent
Minor components: Terrarossa soils occur on less sloping areas. Soils that are moderately deep to bedrock occur on similar positions as Woodcutter soils.

Soil Properties and Qualities

Brewster soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Aridic Lithic Haplustolls

Geomorphic position: generally occurs on summits and back slopes

Parent material: slope alluvium and/or residuum weathered from quartzite

Slope: 10 to 60 percent

Surface cover:

Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent

Soil Survey of San Carlos Indian Reservation, Arizona

Physical cover

canopy plant cover: 20 percent

woody debris: 5 percent

bare soil: 20 percent

rock fragments

gravel: 30 percent

cobble: 45 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.57 to 1.98 inches per hour (4.00 to 14.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 1.2 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Volcanic Hills 12-16" p.z. Clayey

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA117AZ

Present vegetation: sideoats grama, hairy grama, turbinella oak, Texas bluestem, plains lovegrass, purple threeawn, slender grama, perennial forbs, agave, Emory oak, Pringle manzanita, bullgrass, common juniper, green sprangletop, sotol, spidergrass, wolftail

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: Typical pedon description is from Soil Survey of Eastern Pinal and Southern Gila Counties, Arizona; about 1,000 feet south and 1,900 feet east of the northwest corner of Section 30, Township 2 S, Range 15 E

Geographic Coordinate System:

33° 14' 7.80" north, 110° 51' 17.40" west

A1—0 to 3 inches (0 to 8 cm); brown (7.5YR 4/3) very gravelly loam, dark brown (7.5YR 3/3), moist; 19 percent clay; single grain; soft, very friable, nonsticky and slightly plastic; many very fine roots; many very fine pores; 35 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 6.8; abrupt smooth boundary.

A2—3 to 13 inches (8 to 33 cm); brown (7.5YR 4/3) very gravelly loam, dark brown (7.5YR 3/3), moist; 25 percent clay; weak very fine subangular blocky structure; soft, very friable, nonsticky and slightly plastic; many very fine roots; many very fine pores; 35 percent gravel and 15 percent cobble; noneffervescent; neutral, pH 6.8; abrupt wavy boundary.

R—13 to 60 inches (33 to 152 cm); unweathered quartzite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 20 to 35 percent

Rock fragments: 35 to 70 percent

Organic matter: 1 to 3 percent

Effervescence: none

Soil Survey of San Carlos Indian Reservation, Arizona

Reaction (pH): neutral (6.6 to 7.3)

A horizons

Hue: 7.5YR, 10YR

Value: 3 to 4, dry or moist

Chroma: 2 to 3, dry or moist

Texture: clay loam, loam

R horizon

Bedrock is hard quartzite

Rock outcrop

Slope: 10 to 60 percent

Range in Characteristics

Rock outcrop consists of barren rock that occurs as ledges and nearly vertical cliffs of quartzite bedrock. Rock outcrop also includes areas where the depth to bedrock is less than four inches. The higher percentage of rock outcrop is in areas near the summit of mountains.

Woodcutter soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Aridic Lithic Argiustolls

Geomorphic position: generally occurs on summits and back slopes

Parent material: slope alluvium and/or residuum weathered from quartzite

Slope: 10 to 60 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 20 percent

woody debris: 10 percent

bare soil: 20 percent

rock fragments

gravel: 20 percent

cobble: 45 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 1.3 (very low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Volcanic Hills 12-16" p.z. Clayey

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Soil Survey of San Carlos Indian Reservation, Arizona

Ecological site number: R038XA117AZ

Present vegetation: sideoats grama, hairy grama, turbinella oak, Texas bluestem, plains lovegrass, purple threeawn, slender grama, perennial forbs, agave, Emory oak, Pringle manzanita, bullgrass, common juniper, green sprangletop, sotol, spidergrass, wolftail

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: Typical pedon description is from Soil Survey of Eastern Pinal and Southern Gila Counties, Arizona; about 500 feet south and 1,700 feet east of the northwest corner of Section 30, Township 2 S, Range 15 E

Geographic Coordinate System:

33° 14' 7.50" north, 110° 51' 22.30" west

A—0 to 3 inches (0 to 8 cm); brown (7.5YR 4/3) very cobbly loam, dark brown (7.5YR 3/3), moist; 19 percent clay; single grain; soft, very friable, slightly sticky and slightly plastic; many very fine roots; many very fine pores; 10 percent gravel and 40 percent cobble; noneffervescent; slightly acid, pH 6.2; abrupt wavy boundary.

Bt—3 to 13 inches (8 to 33 cm); reddish brown (5YR 4/3) very gravelly clay loam, dark reddish brown (5YR 3/3), moist; 32 percent clay; strong fine and medium subangular blocky structure; soft, very friable, moderately sticky and very plastic; many very fine and fine roots; common very fine pores; many continuous distinct clay films on faces of peds and rock fragments; 30 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 6.6; abrupt wavy boundary.

R—13 to 60 inches (33 to 152 cm); unweathered quartzite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 20 to 35 percent

Rock fragments: 35 to 70 percent

Organic matter: 1 to 3 percent

Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: sandy loam, loam

Bt horizons

Hue: 7.5YR, 5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: clay loam, loam

R horizon

Bedrock is hard quartzite

14—Brolliar-Dedal complex, 0 to 8 percent slopes

Map Unit Setting

Landform(s): plateaus

Soil Survey of San Carlos Indian Reservation, Arizona

Elevation: 5,800 to 7,200 feet (1,768 to 2,195 meters)

Mean annual precipitation: 18 to 24 inches (457 to 610 millimeters)

Mean annual air temperature: 45 to 57 degrees F (7.0 to 13.9 degrees C)

Mean annual soil temperature: 47 to 59 degrees F (8.1 to 15.0 degrees C)

Frost-free period: 120 to 180 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-3 Interior Chaparral-Forests

Map Unit Composition

Brolliar and similar soils: 50 percent

Dedal and similar soils: 25 percent

Minor components: Soils that have more than 35 percent rock fragments in the particle-size control section occur on similar positions as Brolliar soils. Bigprairie soils occur on slightly concave areas and foot slopes. Small areas of rock outcrop occur on slightly higher areas. Frazwell family soils occur on lower drainageways.

Soil Properties and Qualities

Brolliar soils

Taxonomic classification: Fine, smectitic, mesic Pachic Argiustolls

Geomorphic position: generally occurs on the summit of the Natanes Plateau

Parent material: clayey residuum weathered from basalt and/or volcanic rock

Slope: 0 to 8 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

tree canopy cover: 50 percent

plant cover: 20 percent

organic litter: 40 percent

woody debris: 2 percent

bare soil: 20 percent

rock fragments

gravel: 5 percent

cobble: 10 percent

stone: 3 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 3.1 (low)

Shrink-swell potential: about 10.5 LEP (very high)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Pinus ponderosa-Quercus grisea/Bouteloua curtipendula-Poa fendleriana

Other ecological sites may occur in this map unit and vary in extent between

Soil Survey of San Carlos Indian Reservation, Arizona

delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F038XC315AZ

Present vegetation: ponderosa pine, gray oak, alligator juniper, blue grama, bottlebrush squirreltail, Fendler ceanothus, threeawn, perennial forbs

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,350 feet north and 1,750 feet west of southeast corner of Section 31, Township 2 N, Range 24 E

Geographic Coordinate System:

33° 28' 11.07" north, 109° 52' 48.39" west

A—0 to 2.5 inches (0 to 6 cm); grayish brown (10YR 5/2) cobbly clay loam, very dark grayish brown (10YR 3/2), moist; 28 percent clay; moderate medium platy parting to moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine, fine, and medium roots; many very fine and fine pores; 3 percent gravel and 10 percent cobble and 2 percent stone; noneffervescent; neutral, pH 6.6; abrupt smooth boundary.

Bt1—2.5 to 9 inches (6 to 23 cm); dark grayish brown (10YR 4/2) cobbly clay loam, very dark grayish brown (10YR 3/2), moist; 38 percent clay; moderate medium and coarse subangular blocky structure; slightly hard, very friable, moderately sticky and moderately plastic; few very fine and fine and few medium and coarse roots; common very fine and fine pores; common distinct clay films on faces of peds and very many prominent clay films on rock fragments; 5 percent gravel and 15 percent cobble; noneffervescent; neutral, pH 6.6; clear wavy boundary.

Bt2—9 to 22 inches (23 to 56 cm); brown (7.5YR 4/2) very cobbly clay, dark brown (7.5YR 3/2), moist; 53 percent clay; moderate fine and medium subangular blocky structure; hard, firm, very sticky and very plastic; few very fine and fine and few medium and coarse roots; common very fine and fine pores; many distinct clay films on faces of peds and very many prominent clay films on rock fragments; 10 percent gravel and 25 percent cobble and 5 percent stone; noneffervescent; neutral, pH 6.8; clear wavy boundary.

BC—22 to 36 inches (56 to 91 cm); brown (7.5YR 5/4) extremely cobbly clay, brown (7.5YR 4/4), moist; 42 percent clay; 20 percent medium strong brown (7.5YR 5/8) mottles; weak fine and medium subangular blocky structure; hard, firm, very sticky and very plastic; few very fine and fine and few medium and coarse roots; few very fine and fine pores; few faint clay films on faces of peds; 35 percent gravel and 20 percent cobble and 10 percent stone; noneffervescent; neutral, pH 6.8; clear wavy boundary.

R—36 to 60 inches (91 to 152 cm); basalt bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 60 percent

Rock fragments: 10 to 35 percent

Effervescence: none

Reaction (pH): slightly acid to slightly alkaline (6.1 to 7.8)

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Soil Survey of San Carlos Indian Reservation, Arizona

Chroma: 2 to 3, dry or moist
Texture: loam, clay loam
Rock fragments: 5 to 40 percent

Bt horizons

Hue: 5YR, 7.5YR
Value: 4 to 5 dry, 3 to 4 moist
Chroma: 2 to 4, dry or moist
Texture: clay loam, clay, silty clay
Rock fragments: 10 to 50 percent

BC horizons (where present)

Hue: 5YR, 7.5YR
Value: 4 to 5 dry, 3 to 4 moist
Chroma: 3 to 4, dry or moist
Texture: clay loam, clay, silty clay
Rock fragments: 35 to 75 percent

R horizon

Bedrock is andesite or basalt

Brolliar as used in this mapping unit is a taxadjunct to the series because it has a mollic epipedon that is more than 20 inches thick. Brolliar series is Fine, smectitic, mesic Typic Argiustolls.

Dedal soils

Taxonomic classification: Clayey-skeletal, smectitic, mesic Lithic Argiustolls

Geomorphic position: generally occurs on the summit of the Natanes Plateau where andesite or basalt Bedrock is less than 20 inches below the surface

Parent material: clayey residuum weathered from basalt and/or volcanic rock

Slope: 1 to 8 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent

Chemical crust

salt: 0 percent
gypsum: 0 percent

Physical cover

tree canopy cover: 40 percent
plant cover: 40 percent
organic litter: 0 percent
woody debris: 0 percent
bare soil: 18 percent
rock fragments
gravel: 20 percent
cobble: 15 percent
stone: 5 percent
boulder: 2 percent

Depth to restrictive feature(s): 7 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.06 to 1.98 inches per hour (0.42 to 14.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Soil Survey of San Carlos Indian Reservation, Arizona

Available water capacity total inches: 1.6 (very low)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: high

Hydrologic group: D

Ecological site name: Pinus ponderosa-Quercus grisea/Bouteloua curtipendula-Poa fendleriana

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F038XC315AZ

Present vegetation: ponderosa pine, gray oak, alligator juniper, blue grama, bottlebrush squirreltail, Fendler ceanothus, threeawn, perennial forbs

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,795 feet north and 941 feet west of southeast corner of Section 33, Township 2 N, Range 23 E

Geographic Coordinate System:

33° 28' 15.60" north, 109° 56' 49.20" west

A—0 to 1.5 inches (0 to 4 cm); brown (7.5YR 4/3) very cobbly loam, dark brown (7.5YR 3/3), moist; 22 percent clay; weak fine subangular blocky parting to moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine pores; 20 percent gravel and 15 percent cobble and 5 percent stone and 2 percent boulder; noneffervescent; neutral, pH 7.2; abrupt smooth boundary.

Bt—1.5 to 16 inches (4 to 41 cm); dark brown (7.5YR 3/3) very cobbly clay loam, dark brown (7.5YR 3/2), moist; 38 percent clay; strong medium and coarse subangular blocky structure; hard, friable, moderately sticky and moderately plastic; many very fine and fine and few medium and coarse roots; common very fine and fine pores; few distinct pressure faces; common distinct clay films on faces of peds and rock fragments; 10 percent gravel and 20 percent cobble and 10 percent stone and 2 percent boulder; noneffervescent; neutral, pH 7.2; clear wavy boundary.

R—16 to 60 inches (41 to 152 cm); basalt bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 55 percent

Rock fragments: 35 to 65 percent

Effervescence: none

A horizon

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 3 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: loam, clay loam

Rock fragments: 15 to 65 percent

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: clay loam, clay, silty clay
Rock fragments: 35 to 65 percent
Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

R horizon

Bedrock is andesite or basalt

15—Bucklebar-Hayhook complex, 1 to 15 percent slopes

Map Unit Setting

Landform(s): fan terraces

Elevation: 2,500 to 3,600 feet (762 to 1,097 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 60 to 67 degrees F (15.6 to 19.4 degrees C)

Mean annual soil temperature: 62 to 69 degrees F (16.7 to 20.5 degrees C)

Frost-free period: 190 to 250 days

Major Land Resource Area: 41-Southeastern Arizona Basin and Range

Land Resource Unit: 41-2 Chihuahuan-Sonoran Desert Shrub Mix

Map Unit Composition

Bucklebar and similar soils: 50 percent

Hayhook and similar soils: 30 percent

Minor components: Topawa soils occur on stable summits. Eba, Nahda, and Rillino soils occur on eroded areas. Brazito soils occur on drainageways.

Soil Properties and Qualities

Bucklebar soils

Taxonomic classification: Fine-loamy, mixed, superactive, thermic Typic Haplargids

Geomorphic position: generally occurs on summits and back slopes

Parent material: mixed fan alluvium

Slope: 1 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

woody debris: 0 percent

bare soil: 60 percent

rock fragments

gravel: 10 percent

cobble: 5 percent

Drainage class: well drained

Ksat solum: 0.20 to 19.98 inches per hour (1.40 to 141.00 micrometers per second)

Available water capacity total inches: 7.2 (high)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: medium

Hydrologic group: C

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Ecological site name: Loamy Upland 8-12" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R041XB210AZ

Present vegetation: mesquite, whitethorn acacia, mormon tea, annual grasses, turpentine bush, bush muhly, catclaw acacia, perennial forbs, saguaro, shortleaf baccharis, white burrobrush

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 150 feet north and 625 feet west of southeast corner of Section 34, Township 1 S, Range 18 E

Geographic Coordinate System:

33° 17' 44.60" north, 110° 29' 8.40" west

A—0 to 2 inches (0 to 5 cm); reddish brown (5YR 5/4) gravelly coarse sandy loam, reddish brown (5YR 4/3), moist; 10 percent clay; weak thin platy parting to moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine and common medium pores; 20 percent gravel; noneffervescent; neutral, pH 7.0; clear smooth boundary.

Bt1—2 to 6 inches (5 to 15 cm); yellowish red (5YR 4/6) gravelly sandy clay loam, reddish brown (5YR 4/4), moist; 22 percent clay; moderate fine subangular blocky structure; moderately hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine, fine, and medium pores; few faint clay films on faces of peds; 20 percent gravel; noneffervescent; neutral, pH 7.0; clear smooth boundary.

Bt2—6 to 18 inches (15 to 46 cm); reddish brown (5YR 5/4) gravelly sandy clay loam, reddish brown (5YR 4/4), moist; 33 percent clay; weak medium prismatic parting to moderate medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; common very fine, fine, and medium roots; common very fine and fine and few medium pores; few faint clay films on faces of peds; 20 percent gravel; noneffervescent; slightly alkaline, pH 7.6; clear smooth boundary.

Btk—18 to 35 inches (46 to 89 cm); brown (7.5YR 5/4) sandy clay loam, brown (7.5YR 4/4), moist; 22 percent clay; weak coarse prismatic parting to moderate medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; common medium roots; common very fine and fine and few medium pores; very few faint clay films on faces of peds; few fine carbonate masses; 10 percent gravel; slightly effervescent; slightly alkaline, pH 7.7; clear smooth boundary.

Bk—35 to 50 inches (89 to 127 cm); light brown (7.5YR 6/4) sandy loam, brown (7.5YR 4/4), moist; 18 percent clay; weak medium subangular blocky parting to weak fine granular structure; moderately hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine and few medium pores; few fine carbonate masses; 10 percent gravel; slightly effervescent; moderately alkaline, pH 8.2; clear smooth boundary.

C—50 to 65 inches (127 to 165 cm); brown (7.5YR 5/4) gravelly loamy coarse sand, brown (7.5YR 4/4), moist; 4 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and fine pores; 17 percent gravel; very slightly effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 18 to 35 percent

Rock fragments: 10 to 30 percent

A horizon

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 6, dry or moist

Texture: loamy coarse sand, coarse sandy loam, sandy loam

Rock fragments: 10 to 50 percent

Effervescence: none

Reaction (pH): neutral (6.6 to 7.3)

Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 4 to 5 moist

Chroma: 3 to 6, dry or moist

Texture: sandy loam, sandy clay loam, clay loam

Rock fragments: 10 to 30 percent

Effervescence: none to slight

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Btk and Bk horizons

Hue: 5YR, 7.5YR

Value: 5 to 6 dry, 4 to 5 moist

Chroma: 4, dry or moist

Texture: clay loam, sandy clay loam, sandy loam, coarse sandy loam, loamy coarse sand

Rock fragments: 10 to 40 percent

Effervescence: slight to violent

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

C horizon (where present)

Hue: 7.5YR

Value: 5 to 6 dry, 4 to 5 moist

Chroma: 4 to 6, dry or moist

Texture: fine sandy loam, sandy loam, loamy coarse sand

Rock fragments: 5 to 40 percent

Effervescence: none to strong

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

Hayhook soils

Taxonomic classification: Coarse-loamy, mixed, superactive, thermic Typic Haplocambids

Geomorphic position: generally occurs on foot slopes and along drainageways

Parent material: mixed fan alluvium

Slope: 1 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

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salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover: 30 percent
woody debris: 0 percent
bare soil: 80 percent
rock fragments
gravel: 5 percent
Drainage class: well drained
Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)
Available water capacity total inches: 6.5 (moderate)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very low
Hydrologic group: A
Ecological site name: Sandy Loam Upland 8-12" p.z.
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.
Ecological site number: R041XB215AZ
Present vegetation: mesquite, whitethorn acacia, turpentine bush, bush muhly, white burrobush, mormon tea, yucca, catclaw acacia, perennial forbs, shortleaf baccharis
Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 750 feet north and 1,600 feet west of southeast corner of Section 34, Township 1 S, Range 18 E

Geographic Coordinate System:

33° 17' 50.50" north, 110° 29' 20.20" west

A1—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/3) loamy sand, brown (7.5YR 4/3), moist; 4 percent clay; weak thin platy parting to single grain structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine and common medium pores; 10 percent gravel; noneffervescent; neutral, pH 6.6; clear smooth boundary.

A2—2 to 10 inches (5 to 25 cm); brown (7.5YR 5/4) sandy loam, brown (7.5YR 4/4), moist; 8 percent clay; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine and common medium pores; 5 percent gravel; noneffervescent; neutral, pH 6.6; clear smooth boundary.

Bw1—10 to 40 inches (25 to 102 cm); reddish brown (5YR 5/4) sandy loam, reddish brown (5YR 4/4), moist; 12 percent clay; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine and few medium pores; 5 percent gravel; noneffervescent; neutral, pH 6.8; clear smooth boundary.

Bw2—40 to 60 inches (102 to 152 cm); brown (7.5YR 5/4) sandy loam, brown (7.5YR 4/4), moist; 12 percent clay; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots;

Soil Survey of San Carlos Indian Reservation, Arizona

common very fine and fine pores; 10 percent gravel; slightly effervescent; moderately alkaline, pH 7.9.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 18 percent

Rock fragments: 1 to 35 percent

A horizon

Hue: 7.5YR, 10YR

Value: 5 dry, 4 moist

Chroma: 3 to 4, dry or moist

Texture: coarse sandy loam, sandy loam, loamy sand, loamy coarse sand

Rock fragments: 5 to 25 percent

Effervescence: none

Reaction (pH): neutral (6.6 to 7.3)

Bw horizons

Hue: 5YR, 7.5YR

Value: 5 to 6 dry, 4 to 5 moist

Chroma: 4 to 6, dry or moist

Texture: sandy loam, coarse sandy loam, loamy coarse sand

Rock fragments: 5 to 25 percent

Effervescence: none to slight below 25 inches

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

Bk or C horizons (where present)

Hue: 7.5YR

Value: 5 to 6 dry, 4 to 5 moist

Chroma: 4, dry or moist

Texture: fine sandy loam, sandy loam, loamy sand, loamy coarse sand

Rock fragments: 10 to 50 percent

Effervescence: none to strong below 25 inches

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

16—Budlamp-Rock outcrop-Beaumont complex, sandstone, 10 to 50 percent slopes

Map Unit Setting

Landform(s): hills, mountains

Elevation: 4,200 to 6,500 feet (1,280 to 1,981 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Budlamp and similar soils: 40 percent

Rock outcrop: 30 percent

Soil Survey of San Carlos Indian Reservation, Arizona

Beaumont and similar soils: 20 percent

Minor components: Woodcutter soils occur throughout the unit.

Soil Properties and Qualities

Budlamp soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Aridic Lithic Haplustolls

Geomorphic position: generally occurs on back slopes

Parent material: Loamy-skeletal slope alluvium and/or residuum weathered from interbedded sedimentary rock

Slope: 10 to 50 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 70 percent

woody debris: 0 percent

bare soil: 5 percent

rock fragments

gravel: 20 percent

cobble: 20 percent

stone: 25 percent

boulder: 10 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)

Available water capacity total inches: 0.7 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Clayey Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB215AZ

Present vegetation: singleleaf pinyon, Texas bluestem, bullgrass, sideoats grama, Emory oak, plains lovegrass, mountain mahogany, alligator juniper, gray oak, Pringle manzanita

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,300 feet north and 1,150 feet west of southeast corner of Section 33, Township 2 S, Range 26 E

Geographic Coordinate System:

33° 12' 51.00" north, 109° 40' 41.30" west

Soil Survey of San Carlos Indian Reservation, Arizona

A—0 to 5 inches (0 to 13 cm); dark brown (7.5YR 3/2) extremely cobbly loam, very dark brown (7.5YR 2.5/2), moist; 12 percent clay; weak fine subangular blocky parting to weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine and common medium and coarse pores; 30 percent gravel and 40 percent cobble; noneffervescent; slightly acid, pH 6.2; gradual smooth boundary.

Bw—5 to 15 inches (13 to 38 cm); brown (7.5YR 4/3) extremely cobbly loam, dark brown (7.5YR 3/3), moist; 14 percent clay; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; common very fine and fine and common medium and coarse pores; 30 percent gravel and 40 percent cobble; noneffervescent; moderately acid, pH 6.0; abrupt wavy boundary.

R—15 to 60 inches (38 to 152 cm); noncalcareous sandstone bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 8 to 18 percent

Rock fragments: 35 to 75 percent

Effervescence: none

Reaction (pH): moderately acid to neutral (5.6 to 7.3)

A horizon

Hue: 7.5YR

Value: 3 to 4 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: sandy loam, loam

Rock fragments: 35 to 75 percent

B horizon

Hue: 7.5YR

Value: 3 to 5 dry, 2 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: sandy loam, fine sandy loam, loam

Rock fragments: 35 to 75

R horizon

Bedrock is interbedded sedimentary rock, mostly sandstone

Rock outcrop

Slope: 10 to 50 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops and ledges of mostly sandstone and limestone. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

Beaumont soils

Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic Aridic Lithic Argiustolls

Geomorphic position: generally occurs on upper back slopes

Parent material: clayey skeletal alluvium and/or colluvium derived from interbedded sedimentary rock

Slope: 10 to 50 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

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lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover: 70 percent
woody debris: 0 percent
bare soil: 10 percent
rock fragments
gravel: 25 percent
cobble: 30 percent
stone: 15 percent
boulder: 15 percent
Depth to restrictive feature(s): 8 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.06 to 5.95 inches per hour (0.42 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 0.7 (very low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Clayey Hills 16-20" p.z.
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.
Ecological site number: R038XB215AZ
Present vegetation: singleleaf pinyon, Texas bluestem, bullgrass, sideoats grama, Emory oak, plains lovegrass, true mountain mahogany, alligator juniper, gray oak, Pringle manzanita
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,070 feet south and 2,060 feet west of northeast corner of Section 33, Township 2 S, Range 26 E

Geographic Coordinate System:

33° 13' 9.80" north, 109° 40' 52.00" west

A—0 to 3 inches (0 to 8 cm); brown (7.5YR 4/2) extremely cobbly loam, dark brown (7.5YR 3/2), moist; 12 percent clay; weak medium subangular blocky parting to moderate fine granular structure; slightly hard, very friable, slightly sticky and nonplastic; common very fine and fine and few medium and coarse roots; common very fine and fine and common medium and coarse pores; 20 percent gravel and 30 percent cobble and 20 percent stone; noneffervescent; slightly acid, pH 6.4; gradual wavy boundary.

Bt1—3 to 10 inches (8 to 25 cm); brown (7.5YR 4/3) extremely cobbly clay loam, dark brown (7.5YR 3/3), moist; 34 percent clay; moderate fine and medium subangular blocky structure; moderately hard, firm, moderately sticky and moderately plastic; common very fine and fine and few medium and coarse roots; common very fine and fine and few medium and coarse pores; few faint clay films on rock fragments; 20

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percent gravel and 30 percent cobble and 20 percent stone; noneffervescent; neutral, pH 6.6; gradual wavy boundary.

Bt2—10 to 13 inches (25 to 33 cm); reddish brown (5YR 4/3) extremely cobbly clay, dark reddish brown (5YR 3/3), moist; 45 percent clay; strong medium subangular blocky structure; very hard, very firm, very sticky and very plastic; common very fine and fine and few medium and coarse roots; common very fine and fine and few medium and coarse pores; few faint clay films on rock fragments; 20 percent gravel and 30 percent cobble and 20 percent stone; noneffervescent; slightly acid, pH 6.4; clear wavy boundary.

R—13 to 60 inches (33 to 152 cm); noncalcareous sandstone bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 50 percent

Rock fragments: 35 to 75 percent

Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

A horizon

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 moist

Chroma: 2 to 3, dry or moist

Texture: sandy loam, loam, clay loam

Rock fragments: 35 to 75 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 4 dry, 3 moist

Chroma: 3 to 4, dry or moist

Texture: clay, clay loam

Rock fragments: 35 to 75

R horizon

Bedrock is interbedded sedimentary rock, mostly sandstone

Beaumain as used in this mapping unit is a taxadjunct to the series because it has a mixed instead of smectitic mineralogy class as a result of the parent material. The Beaumain series is Clayey-skeletal, smectitic, thermic, Aridic Lithic Argiustolls.

17—Bylas-Rock outcrop-Frye complex, 0 to 20 percent slopes

Map Unit Setting

Landform(s): fan terraces

Elevation: 2,500 to 3,800 feet (762 to 1,158 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 60 to 67 degrees F (15.6 to 19.4 degrees C)

Mean annual soil temperature: 62 to 69 degrees F (16.7 to 20.5 degrees C)

Frost-free period: 190 to 250 days

Major Land Resource Area: 41-Southeastern Arizona Basin and Range

Land Resource Unit: 41-2 Chihuahuan-Sonoran Desert Shrub Mix

Map Unit Composition

Bylas and similar soils: 50 percent

Rock outcrop: 25 percent

Frye and similar soils: 15 percent

Minor components: Nahda soils generally occur on borders of map unit. Stagecoach soils occur on similar positions as Frye. Haplocalcids that are shallow and Torriorthents soils occur on steeper back slopes.

Soil Properties and Qualities

Bylas soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic, shallow Typic Haplodurids

Geomorphic position: generally occurs on summits and back slopes of fan terraces that overlie lacustrine sediments

Parent material: mixed alluvium over Pliocene and Pleistocene age lacustrine deposits

Slope: 0 to 20 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 0 percent

woody debris: 0 percent

bare soil: 0 percent

rock fragments

fine gravel: 20 percent

medium gravel: 30 percent

coarse gravel: 30 percent

cobble: 10 percent

Depth to restrictive feature(s): 4 to 18 inches to duripan; 5 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.60 inches per hour (0.00 to 4.20 micrometers per second)

0.00 to 0.60 inches per hour (0.00 to 4.20 micrometers per second)

Available water capacity total inches: 0.5 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Limy Upland 8-12" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R041XB208AZ

Soil Survey of San Carlos Indian Reservation, Arizona

Present vegetation: creosotebush, ephedra, mariola, whitethorn, mesquite, ocotillo, canotia, annual grasses

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 1,950 feet north and 300 feet west of southeast corner of Section 33, Township 2 S, Range 21 E

Geographic Coordinate System:

33° 12' 48.70" north, 110° 11' 26.70" west

A—0 to 0.5 inches (0 to 1 cm); pale brown (10YR 6/3) very gravelly loam, brown (10YR 4/3), moist; 10 percent clay; strong thin and medium platy structure; soft, loose, nonsticky and nonplastic; many very fine roots; many very fine and fine pores; 40 percent gravel and 5 percent cobble; violently effervescent, 30 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; clear wavy boundary.

Bk—0.5 to 6 inches (1 to 15 cm); very pale brown (10YR 7/3) very flaggy loam, brown (7.5YR 5/4), moist; 10 percent clay; moderate fine and medium subangular blocky structure; soft, loose, nonsticky and nonplastic; common very fine and medium, and few coarse roots; common very fine pores; common fine carbonate masses; 15 percent gravel and 40 percent flagstone; violently effervescent, 32 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; abrupt wavy boundary.

Bkqm—6 to 8 inches (15 to 20 cm); cemented material, duripan.

R—8 to 60 inches (20 to 152 cm); lacustrine limestone bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 8 to 30 percent

Rock fragments: 35 to 60 percent

Depth to duripan: 4 to 20 inches

Calcium carbonate equivalent: 20 to 39 percent

Effervescence: strong to violent

Reaction (pH): moderately alkaline to strongly alkaline (7.9 to 9.0)

A horizon

Hue: 7.5YR, 10YR

Value: 5 to 8 dry, 3 to 6 moist

Chroma: 2 to 4, dry or moist

Texture: sandy loam, loam, clay loam

Rock fragments: 20 to 40 percent

Bk horizons

Hue: 7.5YR, 10YR

Value: 5 to 7 dry, 4 to 5 moist

Chroma: 2 to 4 dry, 3 to 4 moist

Texture: loam, clay loam

Rock fragments: 35 to 60 percent

Bkqm horizon

Indurated and fractured duripan

Thickness of duripan: 1 to 15 inches

Indurated and fractured duripan with laminar cap that is cemented with silicates and carbonates.

Soil Survey of San Carlos Indian Reservation, Arizona

R horizon

Bedrock is lacustrine limestone and sandstone

Rock outcrop

Slope: 0 to 20 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as ledges of Pliocene and Pleistocene lacustrine limestone. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

Frye soils

Taxonomic classification: Fine, mixed, superactive, thermic Typic Argidurids

Geomorphic position: generally occurs on summits of fan terraces that overlie lacustrine sediments

Parent material: mixed alluvium over Pliocene and Pleistocene age lacustrine deposits

Slope: 0 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 27 percent

woody debris: 3 percent

bare soil: 10 percent

rock fragments

fine gravel: 20 percent

medium gravel: 30 percent

coarse gravel: 30 percent

cobble: 5 percent

Depth to restrictive feature(s): 18 to 22 inches to duripan; 20 to 30 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.60 inches per hour (0.00 to 4.20 micrometers per second)

0.00 to 0.60 inches per hour (0.00 to 4.20 micrometers per second)

Available water capacity total inches: 3.3 (low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: low

Hydrologic group: C

Ecological site name: Loamy Upland 8-12" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R041XB210AZ

Soil Survey of San Carlos Indian Reservation, Arizona

Present vegetation: creosotebush, whitethorn, annual grasses, mesquite, perennial grasses, tobosa, ephedra, jojoba, threeawn

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 1,900 feet south and 300 feet west of northeast corner of Section 33, Township 2 S, Range 21 E

Geographic Coordinate System:

33° 13' 6.70" north, 110° 11' 24.00" west

A—0 to 1 inch (0 to 3 cm); brown (7.5YR 5/4) gravelly loam, brown (7.5YR 4/4), moist; 25 percent clay; moderate very fine and fine subangular blocky parting to moderate very fine and fine granular structure; soft, loose, slightly sticky and slightly plastic; many very fine roots; many very fine pores; 30 percent gravel and 4 percent cobble; noneffervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

Bt1—1 to 4 inches (3 to 10 cm); reddish brown (5YR 4/4) gravelly clay loam, brown (7.5YR 4/4), moist; 30 percent clay; strong fine and medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; many very fine and fine roots; many very fine pores; few distinct clay films on faces of peds and many distinct clay bridges between sand grains; 30 percent gravel; noneffervescent; slightly alkaline, pH 7.4; clear wavy boundary.

Bt2—4 to 22 inches (10 to 56 cm); reddish brown (5YR 4/4) gravelly clay loam, reddish brown (5YR 4/4), moist; 36 percent clay; strong fine and medium subangular blocky and moderate fine prismatic structure; hard, firm, very sticky and very plastic; common very fine and fine and few medium roots; many very fine pores; many prominent clay films on faces of peds and few distinct clay bridges between sand grains; 30 percent gravel; noneffervescent; slightly alkaline, pH 7.4; very abrupt wavy boundary.

2Bkqm—22 to 25 inches (56 to 63 cm); cemented material, duripan.

R—25 to 60 inches (63 to 152 cm); lacustrine limestone bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 40 percent

Rock fragments: 5 to 35 percent

Effervescence: none to very slight

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

A horizon

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 2 to 4 moist

Chroma: 4 to 6 dry, 3 to 4 moist

Texture: loam, clay loam

Rock fragments: 5 to 35 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 4 moist

Chroma: 4 to 6 dry, 3 to 4 moist

Soil Survey of San Carlos Indian Reservation, Arizona

Texture: clay loam, clay
Rock fragments: 5 to 35 percent
Gypsum: 0 to 5 percent

Bkqm horizon

Depth to duripan: 7 to 36 inches
Thickness of duripan: 5 to 15 inches
Indurated and fractured duripan with laminar cap that is cemented with silicates and carbonates.

R horizon

Bedrock is lacustrine limestone

18—Cambern-Bushvalley complex, 1 to 15 percent slopes

Map Unit Setting

Landform(s): mountains
Elevation: 7,000 to 8,500 feet (2,134 to 2,591 meters)
Mean annual precipitation: 18 to 28 inches (457 to 711 millimeters)
Mean annual air temperature: 39 to 45 degrees F (4.0 to 7.0 degrees C)
Mean annual soil temperature: 41 to 47 degrees F (5.1 to 8.1 degrees C)
Frost-free period: 70 to 120 days
Major Land Resource Area: 39-Arizona and New Mexico Mountains
Land Resource Unit: 39-1 Mogollon Plateau Coniferous Forests

Map Unit Composition

Cambern and similar soils: 57 percent
Bushvalley and similar soils: 23 percent
Minor components: Ess soils occur throughout the mapping unit. Small areas of Rock outcrop occur on slightly higher areas.

Soil Properties and Qualities

Cambern soils

Taxonomic classification: Fine-loamy, mixed, superactive, frigid Pachic Argiustolls
Geomorphic position: generally occurs on summits and shoulder slopes
Parent material: fine-loamy residuum weathered from basalt and/or volcanic rock
Slope: 1 to 15 percent
Surface cover:

Biological crust

cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent

Chemical crust

salt: 0 percent
gypsum: 0 percent

Physical cover

tree canopy cover: 60 percent
plant cover: 25 percent
organic litter: 30 percent
woody debris: 5 percent
bare soil: 15 percent

Soil Survey of San Carlos Indian Reservation, Arizona

rock fragments
gravel: 10 percent
cobble: 13 percent
stone: 2 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 3.9 (low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: medium

Hydrologic group: C

Ecological site name: Pinus ponderosa-Quercus gambelii/Blepharoneuron tricholepis-Muhlenbergia montana

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F039XA111AZ

Present vegetation: ponderosa pine, Gambel oak, Douglas-fir, New Mexico locust, alligator juniper, mountain muhly, muttongrass, Fendler ceanothus, perennial forbs

Land capability (non irrigated): 5c

Typical Profile

Location

Public Land Survey: 1,550 feet south and 2,500 feet east of the northwest corner of Section 20, Township 3 N, Range 27 E

Geographic Coordinate System:

33° 35' 31.90" north, 109° 33' 19.40" west

Oi—0 to 1 inch (0 to 2 cm) slightly decomposed plant material; 1 percent clay; slightly acid, pH 6.4; abrupt smooth boundary.

A—1 to 4.5 inches (2 to 11 cm); grayish brown (10YR 5/2) cobbly loam, very dark grayish brown (10YR 3/2), moist; 22 percent clay; weak medium subangular blocky parting to moderate fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine pores; 10 percent gravel and 15 percent cobble and 1 percent stone; noneffervescent; slightly acid, pH 6.4; clear smooth boundary.

Bt1—4.5 to 14 inches (11 to 36 cm); brown (7.5YR 4/2) cobbly clay loam, dark brown (7.5YR 3/2), moist; 32 percent clay; weak coarse prismatic parting to moderate medium subangular blocky structure; slightly hard, friable, moderately sticky and moderately plastic; common very fine and fine and few medium and coarse roots; many very fine and fine pores; few distinct clay films on faces of peds and many distinct clay films on rock fragments; 10 percent gravel and 20 percent cobble and 1 percent stone; noneffervescent; slightly acid, pH 6.2; clear wavy boundary.

Bt2—14 to 27 inches (36 to 69 cm); reddish brown (5YR 4/3) cobbly clay loam, dark reddish brown (5YR 3/3), moist; 34 percent clay; weak coarse prismatic parting to moderate medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; few very fine and fine and few medium and coarse roots; many

Soil Survey of San Carlos Indian Reservation, Arizona

very fine and fine pores; few faint clay films on faces of peds and common distinct clay films on rock fragments; 10 percent gravel and 20 percent cobble and 1 percent stone; noneffervescent; slightly acid, pH 6.2; clear wavy boundary.

R—27 to 60 inches (69 to 152 cm); basalt bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 20 to 35 percent

Rock fragments: 10 to 35 percent

Effervescence: none

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: loam

Rock fragments: 5 to 35 percent

Reaction (pH): moderately acid to neutral (5.6 to 7.3)

Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: clay loam, loam

Rock fragments: 10 to 50 percent

Reaction (pH): moderately acid to slightly alkaline (5.6 to 7.8)

R horizon

Bedrock is basalt or other volcanic rock

Bushvalley soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, frigid Lithic Argiustolls

Geomorphic position: generally occurs on summits and shoulder slopes

Parent material: loamy-skeletal residuum weathered from basalt and/or volcanic rock

Slope: 1 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

tree canopy cover: 60 percent

plant cover: 25 percent

organic litter: 14 percent

woody debris: 5 percent

bare soil: 20 percent

rock fragments

gravel: 20 percent

cobble: 15 percent

stone: 1 percent

Depth to restrictive feature(s): 7 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

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Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 0.9 (very low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Pinus ponderosa/Quercus gambelii/Festuca arizonica-Muhlenbergia montana

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F039XA133AZ

Present vegetation: ponderosa pine, Gambel oak, Douglas-fir, New Mexico locust, alligator juniper, mountain muhly, muttongrass, Fendler ceanothus, perennial forbs

Land capability (non irrigated): 5c

Typical Profile

Location

Public Land Survey: 2,150 feet north and 2,160 feet east of the southwest corner of Section 19, Township 3 N, Range 27 E

Geographic Coordinate System:

33° 35' 16.03" north, 109° 34' 24.32" west

Oi—0 to 1 inch (0 to 2 cm) slightly decomposed plant material; 1 percent clay; neutral, pH 6.6; abrupt smooth boundary.

A—1 to 3 inches (2 to 8 cm); brown (7.5YR 5/2) cobbly loam, dark brown (7.5YR 3/2), moist; 22 percent clay; weak fine subangular blocky parting to moderate fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine pores; 10 percent gravel and 15 percent cobble and 5 percent stone; noneffervescent; slightly acid, pH 6.4; clear smooth boundary.

Bt—3 to 12 inches (8 to 30 cm); brown (7.5YR 4/2) extremely cobbly clay loam, dark brown (7.5YR 3/2), moist; 33 percent clay; weak medium prismatic parting to moderate medium subangular blocky structure; hard, friable, moderately sticky and moderately plastic; common very fine and fine and few medium roots; many very fine and fine and few medium pores; few distinct clay films on faces of peds and common distinct clay films on rock fragments; 25 percent gravel and 35 percent cobble and 5 percent stone; noneffervescent; slightly acid, pH 6.4; clear wavy boundary.

R—12 to 60 inches (30 to 152 cm); basalt bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 18 to 35 percent

Rock fragments: 45 to 80 percent

Effervescence: none

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: loam, clay loam

Rock fragments: 25 to 85 percent

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: loam, clay loam, sandy clay loam

Rock fragments: 35 to 85 percent

Reaction (pH): slightly acid to moderately alkaline (6.1 to 8.4)

R horizon

Bedrock is basalt or other volcanic rock

19—Cammerman-Rock outcrop complex, 15 to 55 percent slopes

Map Unit Setting

Landform(s): hills, mountains (fig. 2)

Elevation: 3,000 to 5,000 feet (914 to 1,524 meters)

Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)

Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)

Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)

Frost-free period: 180 to 230 days

Major Land Resource Area: 38-Mogollon Transition



Figure 2.— A south-facing back slope of Cammerman-Rock outcrop complex, 15 to 55 percent slopes.

Soil Survey of San Carlos Indian Reservation, Arizona

Land Resource Unit: 38-1 Lower Interior Chaparral

Map Unit Composition

Cammerman and similar soils: 60 percent

Rock outcrop: 25 percent

Minor components: Romero, Oracle and soils similar to Oracle, but are more than 20 inches to bedrock occur on similar positions as Cammerman. Combate soils occur in drainageways.

Soil Properties and Qualities

Cammerman soils

Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic Ustic Paleargids

Geomorphic position: generally occurs on summits and back slopes

Parent material: clayey slope alluvium and/or colluvium and/or residuum weathered from metamorphic rock

Slope: 15 to 55 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 0 percent

bare soil: 5 percent

rock fragments

gravel: 50 percent

cobble: 28 percent

stone: 2 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.06 to 5.95 inches per hour (0.42 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 1.4 (very low)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Volcanic Hills 12-16" p.z. Clayey

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA117AZ

Present vegetation: annual grasses, sideoats grama, perennial forbs, acacia, juniper, sumac, hairy grama, false mesquite, jojoba, ocotillo, pricklypear, yucca, red brome, threeawn, little barley, sixweeks fescue, Mexican sprangletop

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 300 feet north and 500 feet east of southwest corner of Section 11, Township 01 N, Range 16 E

Geographic Coordinate System:

33° 26' 16.10" north, 110° 39' 4.10" west

A—0 to 3 inches (0 to 8 cm); reddish brown (5YR 5/4) extremely cobbly fine sandy loam, reddish brown (5YR 4/3), moist; 12 percent clay; weak fine subangular blocky parting to moderate fine and medium granular structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine and common medium pores; 35 percent gravel and 30 percent cobble; noneffervescent; slightly acid, pH 6.2; abrupt smooth boundary.

Bt1—3 to 15 inches (8 to 38 cm); reddish brown (2.5YR 5/4) extremely cobbly clay loam, dark reddish brown (2.5YR 3/4), moist; 36 percent clay; moderate medium angular blocky structure; very hard, friable, moderately sticky and moderately plastic; common very fine, fine, medium, and coarse roots; common very fine and fine and few medium pores; few distinct clay films on faces of peds and few prominent clay films on rock fragments; 35 percent gravel and 30 percent cobble; noneffervescent; neutral, pH 6.6; gradual smooth boundary.

Bt2—15 to 26 inches (38 to 66 cm); reddish brown (2.5YR 5/4) extremely cobbly clay, reddish brown (2.5YR 4/4), moist; 45 percent clay; moderate medium angular blocky structure; very hard, firm, very sticky and very plastic; common very fine, fine, medium, and coarse roots; common very fine and fine and few medium pores; few distinct pressure faces; few distinct clay films on faces of peds and few prominent clay films on rock fragments; 35 percent gravel and 30 percent cobble; noneffervescent; neutral, pH 6.6; clear smooth boundary.

R—26 to 60 inches (66 to 152 cm); quartzite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 60 percent

Rock fragments: 35 to 70 percent

Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

A horizon

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Texture: fine sandy loam, sandy loam, loam

Rock fragments: 40 to 70 percent

Bt horizons

Hue: 2.5YR, 5YR, some pedons have 7.5YR above 12 inches

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 6, dry or moist

Texture: clay loam, clay

Rock fragments: 30 to 70 percent

R horizon

Bedrock is hard metamorphic rock

Rock outcrop

Slope: 15 to 55 percent

Range in Characteristics

Rock outcrop consist of barren rock that occurs as ledges or nearly vertical cliffs of quartzite or other metamorphic rock. Rock outcrop also includes areas where the depth to bedrock is less than four inches.

20—Cascabel and Wetrock soils, and Water, 0 to 3 percent slopes

Map Unit Setting

Landform(s): flood plains

Elevation: 2,500 to 3,600 feet (762 to 1,097 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 60 to 67 degrees F (15.6 to 19.4 degrees C)

Mean annual soil temperature: 62 to 69 degrees F (16.7 to 20.5 degrees C)

Frost-free period: 190 to 250 days

Major Land Resource Area: 41-Southeastern Arizona Basin and Range

Land Resource Unit: 41-2 Chihuahuan-Sonoran Desert Shrub Mix

Stream Segment Properties and Qualities

Segment length: about 11.5 miles of the San Carlos River starting at Talkalai Lake and flowing south to the confluence with San Carlos Reservoir.

Active flood plain width: 150 to 3,200 feet

Stream flow: intermittent

Flooding hazard: frequent; brief (2 to 7 days)

Flood month: December-February and July-September

Water table minimum depth: 0 to 30 inches

Water table kind: apparent

Water table present: year round

Bank entrenchment:

percent cut: 70

percent uncut: 30

vertical cut: 1 to 20 feet; averages 3 to 5 feet

Depositional bar features: dynamic system of braided bars and channels that relocate with each major flood event; height varies with the depth and velocity of flood water.

Meander pattern: irregular meander

Channel composition:

percent cobbles: 18

percent gravel: 40

percent sand: 22

percent silt and clay: 20

Stability: dynamic system of braided components that aggrades and degrades seasonally.

Map Unit Composition

Cascabel and similar soils

Wetrock and similar soils

Soil Survey of San Carlos Indian Reservation, Arizona

Water

Minor components: Vertic Torrifluvents soils occur in slack water areas, most commonly near the mouth of the San Carlos River. Typic Fluvaquents soils occur on low areas adjacent to water. Gila soils are found on higher benches away from the river channel.

This is an undifferentiated map unit. These components are not consistently associated geographically. At least one component is present in every delineation, but each delineation can have any combination of the components. This map unit is not consistent over time. The components of this map unit consist of a dynamic system of braided bars and channels. The active stream dynamics will cause these components to shift locations. During severe rainfall events, the channel will cut and fill throughout its length.

Soil Properties and Qualities

Cascabel soils

Taxonomic classification: Sandy, mixed, thermic Oxyaquic Torrifluvents

Geomorphic position: generally occurs on lower benches

Parent material: mixed sandy alluvium

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 5 percent

bare soil: 60 percent

rock fragments

fine gravel: 5 percent

Drainage class: moderately well drained

Ksat solum: 5.95 to 39.69 inches per hour (42.00 to 280.00 micrometers per second)

Available water capacity total inches: 3.7 (low)

Shrink-swell potential: about 1.0 LEP (low)

Flooding hazard: frequent

Seasonal water table minimum depth: about 40 to 71 inches

Runoff class: very low

Hydrologic group: A

Ecological site name: Populus fremontii-Salix gooddingii/Sporobolus wrightii

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F041XB218AZ

Present vegetation: Fremont cottonwood, Gooding willow, perennial grasses, seepwillow baccharis, saltcedar tamarisk, annual grasses

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 1,500 feet north and 2,000 feet west of southeast corner of Section 1, Township 2 S, Range 18 E

Geographic Coordinate System:

33° 17' 6.50" north, 110° 27' 20.10" west

C1—0 to 1 inch (0 to 3 cm); brown (10YR 5/3) loamy sand, brown (10YR 4/3), moist; 5 percent clay; moderate medium platy structure; soft, loose, nonsticky and nonplastic; many very fine roots; many very fine pores; 5 percent gravel; strongly effervescent; slightly alkaline, pH 7.4; clear wavy boundary.

C2—1 to 8 inches (3 to 20 cm); brown (10YR 5/3) loamy sand, brown (10YR 4/3), moist; 5 percent clay; massive; soft, loose, nonsticky and nonplastic; many very fine and fine and few medium roots; many very fine pores; 5 percent gravel; strongly effervescent; slightly alkaline, pH 7.4; clear wavy boundary.

C3—8 to 35 inches (20 to 89 cm); brown (10YR 5/3) sand, brown (10YR 4/3), moist; 5 percent clay; massive; soft, loose, nonsticky and nonplastic; common very fine and fine and many medium and coarse and common very coarse roots; many very fine and fine and common medium pores; 10 percent medium strong brown (7.5YR 5/8), iron-manganese masses and 10 percent medium platy strong brown (7.5YR 5/8), iron-manganese masses; 5 percent gravel; slightly effervescent; slightly alkaline, pH 7.4; clear wavy boundary.

C4—35 to 65 inches (89 to 165 cm); grayish brown (10YR 5/2) gravelly coarse sand, dark grayish brown (10YR 4/2), moist; 5 percent clay; massive; soft, loose, nonsticky and nonplastic; common very fine and fine roots; many fine pores; 30 percent gravel; noneffervescent; slightly alkaline, pH 7.4.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 10 percent

Rock fragments: 5 to 30 percent

Effervescence: slight to violent

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

C1 horizon

Hue: 7.5YR, 10YR

Value: 3 to 5, dry or moist

Chroma: 3 to 4 dry, 2 to 3 moist

Texture: silty clay loam, fine sandy loam, sandy loam, loamy sand, coarse sand

Rock fragments: 5 to 10 percent

C2, C3, and C4 horizons

Hue: 7.5YR, 10YR

Value: 3 to 5, dry or moist

Chroma: 3 to 4 dry, 2 to 3 moist

Texture: sandy loam, loamy sand, sand with strata of coarser or finer textures

Rock fragments: 5 to 30 percent

Wetrock soils

Taxonomic classification: Sandy-skeletal, mixed, thermic Oxyaquic Torrifuvents

Geomorphic position: generally occurs on lower benches

Parent material: mixed sandy and gravelly alluvium

Soil Survey of San Carlos Indian Reservation, Arizona

Slope: 0 to 3 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 35 percent

 woody debris: 5 percent

 bare soil: 15 percent

 rock fragments

 fine gravel: 20 percent

 medium gravel: 25 percent

 coarse gravel: 25 percent

 cobble: 10 percent

Drainage class: moderately well drained

Ksat solum: 0.20 to 39.69 inches per hour (1.40 to 280.00 micrometers per second)

Available water capacity total inches: 1.9 (very low)

Shrink-swell potential: about 3.5 LEP (moderate)

Flooding hazard: frequent

Seasonal water table minimum depth: about 40 to 71 inches

Runoff class: very low

Hydrologic group: A

Ecological site name: Populus fremontii-Salix gooddingii/Sporobolus wrightii

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F041XB218AZ

Present vegetation: Fremont cottonwood, Gooding willow, perennial grasses, seepwillow baccharis, saltcedar tamarisk, annual grasses

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 1,450 feet north and 1,950 feet west of southeast corner of Section 1, Township 2 S, Range 18 E

Geographic Coordinate System:

33° 17' 5.70" north, 110° 27' 19.50" west

C1—0 to 1 inch (0 to 3 cm); light brown (7.5YR 6/3) very gravelly sandy clay loam, brown (7.5YR 5/3), moist; 23 percent clay; weak medium platy structure; soft, loose, slightly sticky and nonplastic; common very fine roots; many fine pores; 50 percent gravel and 5 percent cobble; strongly effervescent; slightly alkaline, pH 7.6; abrupt wavy boundary.

C2—1 to 8 inches (3 to 20 cm); brown (7.5YR 5/3) very gravelly coarse sand, brown (7.5YR 5/3), moist; 5 percent clay; massive; loose, nonsticky and nonplastic; common very fine roots; many very fine pores; 40 percent gravel; slightly effervescent; neutral, pH 7.2; clear wavy boundary.

C3—8 to 20 inches (20 to 51 cm); brown (7.5YR 5/3) very gravelly coarse sand, brown (7.5YR 5/3), moist; 5 percent clay; massive; loose, nonsticky and nonplastic;

Soil Survey of San Carlos Indian Reservation, Arizona

many very fine and fine and few coarse roots; many very fine pores; 45 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 7.2; clear wavy boundary.

C4—20 to 60 inches (51 to 152 cm); brown (7.5YR 5/3) very gravelly coarse sand, brown (7.5YR 5/3), moist; 5 percent clay; massive; loose, nonsticky and nonplastic; many very fine and fine roots; many very fine pores; 50 percent gravel; noneffervescent; neutral, pH 7.2.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 3 to 10 percent

Rock fragments: 35 to 50 percent

Effervescence: none to strong

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

C1 horizon

Hue: 7.5YR, 10YR

Value: 4 to 6 dry, 4 to 5 moist

Chroma: 2 to 3, dry or moist

Texture: sandy clay loam, silt loam, loamy sand, fine sandy loam, coarse sand

Rock fragments: 5 to 50 percent

C2, C3, and C4 horizons

Hue: 7.5YR, 10YR

Value: 4 to 5, dry or moist

Chroma: 3 dry, 2 to 3 moist

Texture: coarse sand with strata of finer textures

Rock fragments: 10 to 50 percent

Water

Range in Characteristics

Water includes the San Carlos River.

21—Cellar-Rock outcrop complex, 20 to 70 percent slopes

Map Unit Setting

Landform(s): mountains

Elevation: 1,900 to 4,190 feet (578 to 1,277 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 64 to 70 degrees F (17.8 to 21.1 degrees C)

Mean annual soil temperature: 66 to 72 degrees F (18.9 to 22.2 degrees C)

Frost-free period: 220 to 280 days

Major Land Resource Area: 40-Sonoran Basin and Range

Land Resource Unit: 40-1 Upper Sonoran Desert Shrub

Map Unit Composition

Cellar and similar soils: 60 percent

Rock outcrop: 35 percent

Minor components: Haplargids soils that have greater than 35 percent clay content and/or less than 35 percent rock fragments occur on similar positions as Cellar.

Soil Properties and Qualities

Cellar soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, nonacid, thermic Lithic Torriorthents

Geomorphic position: generally occurs on summits and back slopes

Parent material: slope alluvium and/or residuum weathered from granite

Slope: 20 to 70 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 25 percent

woody debris: 5 percent

bare soil: 40 percent

rock fragments

gravel: 60 percent

cobble: 15 percent

Depth to restrictive feature(s): 6 to 15 inches to bedrock, paralithic; 8 to 20 inches to bedrock, lithic

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 0.5 (very low)

Shrink-swell potential: about 1.4 LEP (low)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Shallow Hills 10-13" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R040XA105AZ

Present vegetation: triangle bursage, annual grasses, littleleaf paloverde, saguaro, brittlebush, ocotillo, wolfberry, barrel cactus

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: Typical pedon description is from Soil Survey of Eastern Pinal and Southern Gila Counties, Arizona; about 1,800 feet east and 1,800 feet north of the southeast corner of Section 31, Township 9 S, Range 11 E

Geographic Coordinate System:

32° 36' 14.00" north, 111° 15' 3.00" west

A—0 to 2 inches (0 to 5 cm); yellowish brown (10YR 5/4) very gravelly sandy loam, dark brown (10YR 3/3), moist; 13 percent clay; weak thin platy parting to weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and

Soil Survey of San Carlos Indian Reservation, Arizona

fine roots; many fine pores; 50 percent gravel and 5 percent cobble; noneffervescent; slightly alkaline, pH 7.6; abrupt smooth boundary.

C—2 to 12 inches (5 to 30 cm); yellowish brown (10YR 5/6) extremely gravelly sandy loam, dark yellowish brown (10YR 3/4), moist; 14 percent clay; weak very fine subangular blocky parting to weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and few medium roots; many fine and medium pores; 70 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 6.6; abrupt wavy boundary.

Cr—12 to 14 inches (30 to 36 cm); abrupt wavy boundary.

R—14 to 60 inches (36 to 152 cm).

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 18 percent

Rock fragments: 35 to 75 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

A horizon

Hue: 7.5YR, 10YR

Value: 5 to 6 dry, 3 to 4 moist

Chroma: 4 dry, 3 to 4 moist

Texture: sandy loam

C horizons

Hue: 7.5 YR, 10YR

Value: 5 dry, 3 to 4 moist

Chroma: 4 to 6 dry, 3 to 4 moist

Texture: sandy loam

Cr and R horizons

Bedrock is hard granite. Not all pedons have paralithic material above bedrock.

When present, it is less than 3 inches thick.

Rock outcrop

Slope: 20 to 70 percent

Range in Characteristics

Rock outcrop consists of barren rock that occurs as ledges, massive boulder piles, and nearly vertical cliffs of granite. Rock outcrop also includes areas where the depth to bedrock is less than four inches. The higher percentage of rock outcrop is in areas near the summit of mountains.

22—Cherrycow-Hathaway families complex, 15 to 50 percent slopes

Map Unit Setting

Landform(s): hills, pediments

Elevation: 4,000 to 5,800 feet (1,219 to 1,768 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Soil Survey of San Carlos Indian Reservation, Arizona

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Cherrycow family and similar soils: 40 percent

Hathaway family and similar soils: 38 percent

Minor components: Terrarossa soils occur on broader summits and foot slopes.

Coppercan and soils similar to Cherrycow soils that have a calcic horizon in the lower part occur on back slopes. Soils that are shallow to a Petrocalcic horizon occur on narrow summits and shoulder slopes.

Soil Properties and Qualities

Cherrycow family soils

Series and series family designations are naming expedients and equal.

Taxonomic classification: Fine, smectitic, thermic Aridic Argiustolls

Geomorphic position: generally occurs on broader summits, less sloping back slopes, and foot slopes

Parent material: clayey alluvium and/or colluvium derived from volcanic and sedimentary rock

Slope: 15 to 50 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 70 percent

woody debris: 0 percent

bare soil: 10 percent

rock fragments

gravel: 40 percent

cobble: 10 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, paralithic

Drainage class: well drained

Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)

Available water capacity total inches: 2.6 (low)

Shrink-swell potential: about 10.5 LEP (very high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Clayey Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB215AZ

Soil Survey of San Carlos Indian Reservation, Arizona

Present vegetation: sideoats grama, curly mesquite, tobosa, Opuntia, perennial forbs, turbinella oak, redberry juniper, sacahuista, singleleaf pinyon

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,480 feet north and 300 feet east of southwest corner of Section 24, Township 3 S, Range 26 E

Geographic Coordinate System:

33° 9' 23.50" north, 109° 38' 20.30" west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/2) very cobbly clay loam, dark brown (7.5YR 3/2), moist; 32 percent clay; moderate fine and medium granular structure; slightly hard, friable, moderately sticky and moderately plastic; common very fine and fine roots; common very fine and fine and common medium and coarse pores; 20 percent gravel and 15 percent cobble; noneffervescent; neutral, pH 6.8; clear smooth boundary.

Bt1—2 to 12 inches (5 to 30 cm); reddish brown (5YR 4/3) cobbly clay, dark reddish brown (5YR 3/3), moist; 55 percent clay; strong medium and coarse angular blocky structure; very hard, very firm, very sticky and very plastic; common very fine and fine and common medium and coarse roots; common very fine and fine and common medium and coarse pores; few distinct clay films on faces of peds and rock fragments; 15 percent gravel and 10 percent cobble and 1 percent stone; noneffervescent; neutral, pH 6.8; gradual wavy boundary.

Bt2—12 to 28 inches (30 to 71 cm); reddish brown (5YR 5/4) very gravelly clay, reddish brown (5YR 4/4), moist; 50 percent clay; strong medium and coarse angular blocky structure; very hard, very firm, very sticky and very plastic; few very fine and fine and few medium and coarse roots; common very fine and fine and few medium and coarse pores; few distinct clay films on faces of peds and rock fragments; 25 percent gravel and 10 percent cobble and 1 percent stone; noneffervescent; neutral, pH 7.0; clear wavy boundary.

2Cr—28 to 60 inches (71 to 152 cm); weakly cemented calcareous sandstone and conglomerate bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 38 to 55 percent

Rock fragments: 15 to 35 percent

Effervescence: none

Reaction (pH): neutral (6.6 to 7.3)

A horizon

Hue: 7.5YR

Value: 4 dry, 2.5 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay loam, loam

Rock fragments: 15 to 55 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2.5 to 4 moist

Chroma: 2 to 4, dry or moist

Soil Survey of San Carlos Indian Reservation, Arizona

Texture: clay, clay loam

Rock fragments: 10 to 40 percent

2Cr horizon

Bedrock is calcareous conglomerate and sandstone

Hathaway family soils

Series and series family designations are naming expedients and equal.

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Aridic

Calciustolls

Geomorphic position: generally occurs on narrow summits, shoulders, and back slopes

Parent material: loamy-skeletal slope alluvium and/or residuum weathered from calcareous conglomerate and/or sandstone

Slope: 15 to 50 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 70 percent

woody debris: 0 percent

bare soil: 10 percent

rock fragments

gravel: 40 percent

cobble: 15 percent

stone: 1 percent

Depth to restrictive feature(s): 20 to 35 inches to bedrock, paralithic

Drainage class: well drained

Ksat solum: 0.57 to 5.95 inches per hour (4.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)

Available water capacity total inches: 2.5 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: high

Hydrologic group: C

Ecological site name: Limy Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB230AZ

Present vegetation: black grama, redberry juniper, curlymesquite, sacahuista, sideoats grama, banana yucca, honey mesquite, turbinella oak

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 160 feet north and 65 feet west of southeast corner of Section 23, Township 3 S, Range 26 E

Soil Survey of San Carlos Indian Reservation, Arizona

Geographic Coordinate System:

33° 9' 0.50" north, 109° 38' 24.60" west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/2) gravelly loam, dark brown (7.5YR 3/2), moist; 22 percent clay; moderate fine and medium subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine and fine and common medium and coarse roots; common very fine and fine and common medium and coarse pores; 20 percent gravel and 2 percent cobble; violently effervescent, 11 percent calcium carbonate equivalent; slightly alkaline, pH 7.8; clear smooth boundary.

Bk1—2 to 8 inches (5 to 20 cm); brown (7.5YR 4/2) gravelly loam, dark brown (7.5YR 3/2), moist; 25 percent clay; moderate fine and medium subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine and fine and common medium and coarse roots; common very fine and fine and few medium and coarse pores; few carbonate coats on rock fragments; common fine and medium carbonate masses; 25 percent gravel and 2 percent cobble; violently effervescent, 13 percent calcium carbonate equivalent; slightly alkaline, pH 7.8; gradual wavy boundary.

Bk2—8 to 18 inches (20 to 46 cm); brown (7.5YR 5/4) very gravelly sandy loam, brown (7.5YR 4/4), moist; 12 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common medium and coarse roots; common very fine and fine and common medium and coarse pores; many carbonate coats on rock fragments; common fine and medium carbonate masses; 35 percent gravel and 2 percent cobble; violently effervescent, 13 percent calcium carbonate equivalent; moderately alkaline, pH 8.0; gradual wavy boundary.

Bk3—18 to 30 inches (46 to 76 cm); brown (7.5YR 5/3) very gravelly sandy loam, brown (7.5YR 4/3), moist; 14 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few medium and coarse roots; common very fine and fine and common medium and coarse pores; common carbonate coats on rock fragments; common fine and medium carbonate masses; 35 percent gravel and 2 percent cobble; violently effervescent, 11 percent calcium carbonate equivalent; slightly alkaline, pH 7.8; gradual wavy boundary.

Cr—30 to 60 inches (76 to 152 cm); calcareous conglomerate bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 10 to 25 percent

Rock fragments: 35 to 70 percent

Depth to calcic horizon: 2 to 13 inches

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 moist

Chroma: 2 to 3, dry or moist

Texture: sandy loam, loam

Rock fragments: 15 to 65 percent

Calcium carbonate equivalent: 5 to 15 percent

Bk horizons

Hue: 7.5YR, 10YR

Value: 4 to 6 dry, 3 to 4 moist

Chroma: 2 to 4, dry or moist
Texture: sandy loam, loam
Rock fragments: 20 to 70 percent
Calcium carbonate equivalent: 10 to 30 percent

Cr horizon

Bedrock is calcareous conglomerate and sandstone

23—Cherrycow-Kuykendall-Rock outcrop complex, 1 to 8 percent slopes

Map Unit Setting

Landform(s): hills

Elevation: 4,200 to 5,800 feet (1,280 to 1,768 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Cherrycow and similar soils: 36 percent

Kuykendall and similar soils: 35 percent

Rock outcrop: 10 percent

Minor components: Beaumain soils occur along borders of the map unit. Cloverdale soils occur on similar positions.

Soil Properties and Qualities

Cherrycow soils

Taxonomic classification: Fine, smectitic, thermic Aridic Argiustolls

Geomorphic position: generally occurs on summits and back slopes

Parent material: clayey alluvium and/or residuum weathered from andesite and/or basalt

Slope: 1 to 8 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

woody debris: 0 percent

bare soil: 20 percent

rock fragments

fine gravel: 10 percent

medium gravel: 15 percent

coarse gravel: 10 percent

cobble: 5 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic

Soil Survey of San Carlos Indian Reservation, Arizona

Drainage class: well drained

Ksat solum: 0.00 to 0.06 inches per hour (0.01 to 0.42 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 4.1 (low)

Shrink-swell potential: about 10.0 LEP (very high)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Clayey Upland 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB202AZ

Present vegetation: tobosa, prairie junegrass, annual grasses, blue grama, bottlebrush squirreltail, curly mesquite, perennial forbs, sideoats grama, vine mesquite

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,400 feet north and 1,100 feet west of southeast corner of Section 26, Township 1 N, Range 22 E

Geographic Coordinate System:

33° 23' 56.40" north, 110° 0' 56.80" west

A—0 to 0.5 inches (0 to 1 cm); dark brown (7.5YR 3/3) very gravelly clay, very dark gray (7.5YR 3/1), moist; 45 percent clay; moderate thick platy parting to strong fine and medium granular structure; slightly hard, firm, very sticky and very plastic; many very fine roots; common very fine and fine pores; 30 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 7.2; diffuse wavy boundary.

Bt1—0.5 to 16 inches (1 to 41 cm); dark brown (7.5YR 3/3) clay, dark brown (7.5YR 3/3), moist; 55 percent clay; strong medium and coarse subangular blocky structure; extremely hard, extremely firm, very sticky and very plastic; common very fine roots; common very fine and fine pores; many prominent clay films on faces of peds and rock fragments; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.4; diffuse wavy boundary.

Bt2—16 to 27.5 inches (41 to 70 cm); dark brown (7.5YR 3/3) clay, dark brown (7.5YR 3/3), moist; 55 percent clay; strong coarse and very coarse subangular blocky structure; extremely hard, extremely firm, very sticky and very plastic; common very fine roots; common very fine and fine pores; very many prominent clay films on faces of peds and rock fragments; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.4; clear wavy boundary.

R—27.5 to 60 inches (70 to 152 cm); basalt bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 45 to 60 percent

Rock fragments: 5 to 10 percent

Cracks:

Width: 0.2 to 0.8 inches

Depth: surface to 30 inches

Effervescence: none

Soil Survey of San Carlos Indian Reservation, Arizona

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

A horizon

Hue: 7.5YR, 10YR
Value: 3 to 5 dry, 3 moist
Chroma: 2 to 3 dry, 1 to 3 moist
Texture: clay
Rock fragments: 5 to 30 percent

Bt horizons

Hue: 5YR, 7.5YR
Value: 3 to 4 dry, 2.5 to 3 moist
Chroma: 2 to 3 dry, 1 to 3 moist
Texture: clay
Rock fragments: 5 to 10 percent

R horizon

Bedrock is basalt or andesite

Kuykendall soils

Taxonomic classification: Clayey, smectitic, thermic Aridic Lithic Argiustolls

Geomorphic position: generally occurs on summits and back slopes

Parent material: clayey alluvium and/or residuum weathered from andesite and/or basalt

Slope: 1 to 8 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent

Chemical crust

salt: 0 percent
gypsum: 0 percent

Physical cover

canopy plant cover: 25 percent
woody debris: 0 percent
bare soil: 5 percent
rock fragments
fine gravel: 30 percent
medium gravel: 30 percent
coarse gravel: 10 percent

Depth to restrictive feature(s): 4 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 1.1 (very low)

Shrink-swell potential: about 10.0 LEP (very high)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Volcanic Upland 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Soil Survey of San Carlos Indian Reservation, Arizona

Ecological site number: R038XB213AZ

Present vegetation: blue grama, sideoats grama, shrubby buckwheat, annual grasses, black grama, bottlebrush squirreltail, curly mesquite, hairy grama, perennial forbs, prairie junegrass, sacahuista, tobosa

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,400 feet north and 1,050 feet west of southeast corner of Section 26, Township 1 N, Range 22 E

Geographic Coordinate System:

33° 23' 55.70" north, 110° 0' 56.10" west

A—0 to 0.5 inches (0 to 1 cm); dark brown (7.5YR 3/3) gravelly clay loam, dark brown (7.5YR 3/2), moist; 35 percent clay; strong very fine granular structure; soft, loose, very sticky and very plastic; many very fine roots; common very fine pores; 30 percent gravel; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt—0.5 to 10 inches (1 to 25 cm); dark brown (7.5YR 3/3) gravelly clay, dark brown (7.5YR 3/3), moist; 50 percent clay; strong medium and coarse subangular blocky structure; hard, firm, very sticky and very plastic; common very fine roots; common very fine pores; many distinct clay films on faces of peds; 25 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

R—10 to 60 inches (25 to 152 cm); basalt bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 40 to 55

Rock fragments: 5 to 30 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

A horizon

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay loam, clay

Rock fragments: 5 to 30 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 4 dry, 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay

Rock fragments: 5 to 15 percent

R horizon

Bedrock is basalt or andesite

Rock outcrop

Slope: 1 to 8 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops and ledges of Tertiary basalt. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

24—Cloverdale stony clay loam, 1 to 15 percent slopes

Map Unit Setting

Landform(s): fan terraces

Elevation: 4,200 to 5,800 feet (1,280 to 1,768 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Cloverdale, stony and similar soils: 90 percent

Minor components: Limpia family soils occur throughout the map unit.

Soil Properties and Qualities

Cloverdale, stony soils

Taxonomic classification: Fine, smectitic, thermic Torrtic Argiustolls

Geomorphic position: generally occurs on broad summits of fan terraces

Parent material: clayey alluvium and/or colluvium derived from volcanic rock

Slope: 1 to 15 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 30 percent

 woody debris: 0 percent

 bare soil: 25 percent

 rock fragments

 gravel: 35 percent

 cobble: 15 percent

 stone: 5 percent

 boulder: 2 percent

Drainage class: well drained

Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)

Available water capacity total inches: 5.1 (moderate)

Shrink-swell potential: about 10.0 LEP (very high)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Clayey Upland 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB202AZ

Present vegetation: little barley, pricklypear, red brome, bottlebrush squirreltail, mesquite, perennial forbs

Soil Survey of San Carlos Indian Reservation, Arizona

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,500 feet north and 900 feet east of southwest corner of Section 1, Township 1 S, Range 23 E

Geographic Coordinate System:

33° 22' 22.57" north, 109° 56' 48.47" west

A—0 to 2 inches (0 to 5 cm); dark grayish brown (10YR 4/2) stony clay loam, very dark grayish brown (10YR 3/2), moist; 30 percent clay; strong fine and medium subangular blocky parting to strong very fine and fine granular structure; moderately hard, very friable, very sticky and very plastic; many very fine and few medium roots; many very fine and fine and few medium pores; 15 percent gravel and 5 percent cobble and 5 percent stone; noneffervescent; slightly alkaline, pH 7.4; abrupt smooth boundary.

Bt1—2 to 24 inches (5 to 61 cm); dark grayish brown (10YR 4/2) stony clay, very dark grayish brown (10YR 3/2), moist; 45 percent clay; strong medium and coarse angular blocky and strong coarse wedge structure; hard, firm, very sticky and very plastic; many very fine and fine and few medium roots; many very fine and fine pores; few distinct pressure faces; common distinct clay films on faces of peds and rock fragments and few distinct clay films on surfaces along root channels; 5 percent gravel and 5 percent cobble and 10 percent stone; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt2—24 to 36 inches (61 to 91 cm); brown (7.5YR 4/2) very cobbly clay, dark brown (7.5YR 3/2), moist; 41 percent clay; moderate medium and coarse subangular blocky and moderate medium and coarse wedge structure; hard, firm, very sticky and very plastic; common very fine and fine roots; common very fine and fine pores; few prominent pressure faces; few distinct clay films on faces of peds and rock fragments; 25 percent gravel and 15 percent cobble and 10 percent stone; noneffervescent; neutral, pH 7.2; gradual wavy boundary.

Btk—36 to 60 inches (91 to 152 cm); reddish brown (5YR 4/4) extremely cobbly clay loam, brown (7.5YR 4/4), moist; 38 percent clay; weak medium subangular blocky structure; moderately hard, friable, very sticky and very plastic; common very fine and fine roots; common very fine and fine pores; common distinct clay films on rock fragments; 5 percent fine and medium iron-manganese nodules; common medium carbonate masses on bottom of rock fragments and common medium and coarse carbonate nodules on bottom of rock fragments; 30 percent gravel and 20 percent cobble and 10 percent stone; strongly effervescent; strongly alkaline, pH 8.6.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 60 percent

Rock fragments: 10 to 35 percent

Cracks:

Width: 0.5 to 1 inch

Depth: surface to 30 inches

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay, clay loam

Rock fragments: 10 to 50 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Bt horizons

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay, clay loam

Rock fragments: 10 to 60 percent

Effervescence: none

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

Btk horizon

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 4 moist

Chroma: 4, dry or moist

Texture: clay, clay loam, sandy clay loam, loam

Rock fragments: 35 to 70 percent

Effervescence: slight to strong

Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 9.0)

25—Cloverdale-Cherrycow-Kuykendall complex, 2 to 10 percent slopes

Map Unit Setting

Landform(s): hills

Elevation: 4,200 to 5,800 feet (1,280 to 1,768 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Cloverdale and similar soils: 50 percent

Cherrycow and similar soils: 25 percent

Kuykendall and similar soils: 20 percent

Minor components: Soils that contain greater than 35 percent rock fragments and Rock outcrop occur throughout the map unit.

Soil Properties and Qualities

Cloverdale soils

Taxonomic classification: Fine, smectitic, thermic Torrertic Haplustalfs

Geomorphic position: generally occurs on foot slopes and toe slopes

Parent material: clayey alluvium and/or residuum weathered from basalt

Slope: 2 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Soil Survey of San Carlos Indian Reservation, Arizona

Chemical crust
 salt: 0 percent
 gypsum: 0 percent
Physical cover
 canopy plant cover: 40 percent
 woody debris: 0 percent
 bare soil: 35 percent
 rock fragments
 fine gravel: 5 percent
 medium gravel: 2 percent
 coarse gravel: 10 percent
 cobble: 25 percent
 stone: 10 percent
 boulder: 5 percent
Depth to restrictive feature(s): 50 to 65 inches to bedrock, paralithic; 53 to 80 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.00 to 0.20 inches per hour (0.01 to 1.40 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 8.1 (high)
Shrink-swell potential: about 10.0 LEP (very high)
Flooding hazard: none
Runoff class: medium
Hydrologic group: D
Ecological site name: Clayey Upland 16-20" p.z.
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.
Ecological site number: R038XB202AZ
Present vegetation: tobosa, prairie junegrass, annual grasses, blue grama, bottlebrush squirreltail, curly mesquite, perennial forbs, vine mesquite
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 450 feet north and 70 feet east of southwest corner of Section 35, Township 1 S, Range 23 E

Geographic Coordinate System:

33° 17' 47.52" north, 109° 57' 59.62" west

A—0 to 1 inch (0 to 3 cm); brown (7.5YR 4/2) cobbly clay, dark brown (7.5YR 3/2), moist; 48 percent clay; strong medium and coarse granular structure; very hard, very firm, very sticky and very plastic; many very fine and fine roots; many very fine and fine pores; 10 percent gravel and 20 percent cobble; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt—1 to 11 inches (3 to 28 cm); brown (7.5YR 4/3) clay, brown (7.5YR 4/3), moist; 57 percent clay; strong medium and coarse angular blocky structure; very hard, very firm, very sticky and very plastic; many very fine and fine roots; common fine and common medium pores; few prominent pressure faces; many distinct clay films on faces of peds; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.8; gradual wavy boundary.

Soil Survey of San Carlos Indian Reservation, Arizona

Btss—11 to 49 inches (28 to 124 cm); brown (7.5YR 4/2) clay, brown (7.5YR 4/2), moist; 60 percent clay; strong coarse wedge and strong medium and coarse angular blocky structure; very hard, very firm, very sticky and very plastic; common very fine and fine roots; common medium and coarse pores; common prominent slickensides; many prominent pressure faces; common distinct clay films on faces of peds; 5 percent gravel; noneffervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Btk—49 to 53 inches (124 to 135 cm); brown (7.5YR 5/3) clay loam, brown (7.5YR 5/4), moist; 38 percent clay; weak fine and medium subangular blocky structure; slightly hard, friable, very sticky and very plastic; few fine roots; common very fine and fine pores; common prominent clay films on faces of peds; many carbonate masses; 10 percent gravel; violently effervescent; strongly alkaline, pH 8.8; clear wavy boundary.

Cr—53 to 55 inches (135 to 140 cm); weathered basalt bedrock.

R—55 to 60 inches (140 to 152 cm); basalt bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 60 percent

Rock fragments: 1 to 35 percent

Cracks:

Width: 0.5 to 1 inch

Depth: surface to 30 inches

A horizon

Hue: 7.5YR

Value: 3 to 4, dry or moist

Chroma: 2 to 3, dry or moist

Texture: clay, clay loam

Rock fragments: 5 to 40 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 4, dry or moist

Chroma: 2 to 3, dry or moist

Texture: clay, clay loam

Rock fragments: 1 to 15 percent

Effervescence: none to slight

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

Btk horizons

Hue: 7.5YR

Value: 4 to 7 dry, 4 to 6 moist

Chroma: 3 to 4, dry or moist

Texture: clay, clay loam

Rock fragments: 1 to 15 percent

Calcium carbonate equivalent: 1 to 15 percent

Effervescence: very slight to violent

Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 9.0)

R horizons

Bedrock is basalt or andesite

Soil Survey of San Carlos Indian Reservation, Arizona

Cloverdale as used in this mapping unit is a taxadjunct to the series because it does not meet the color and/or thickness requirements for a mollic epipedon. Cloverdale series is Fine, smectitic, thermic Torrertic Argiustolls.

Cherrycow soils

Taxonomic classification: Fine, smectitic, thermic Aridic Argiustolls

Geomorphic position: generally occurs on summits and shoulder slopes

Parent material: clayey alluvium and/or residuum weathered from andesite and/or basalt

Slope: 2 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 35 percent

woody debris: 0 percent

bare soil: 30 percent

rock fragments

fine gravel: 5 percent

medium gravel: 5 percent

coarse gravel: 10 percent

cobble: 10 percent

stone: 15 percent

Depth to restrictive feature(s): 20 to 40 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.00 to 0.06 inches per hour (0.01 to 0.42 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 4.4 (low)

Shrink-swell potential: about 10.0 LEP (very high)

Flooding hazard: none

Runoff class: high

Hydrologic group: D

Ecological site name: Clayey Upland 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB202AZ

Present vegetation: tobosa, prairie junegrass, annual grasses, blue grama, bottlebrush squirreltail, curly mesquite, perennial forbs, vine mesquite

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,070 feet south and 2,220 feet east of northwest corner of Section 35, Township 1 S, Range 23 E

Geographic Coordinate System:

33° 18' 23.85" north, 109° 57' 33.77" west

Soil Survey of San Carlos Indian Reservation, Arizona

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/3) clay, dark brown (7.5YR 3/3), moist; 45 percent clay; moderate medium and coarse subangular blocky parting to strong fine and medium granular structure; slightly hard, very friable, very sticky and very plastic; many very fine and fine and common medium roots; many very fine and fine and common medium pores; 5 percent gravel and 2 percent cobble; noneffervescent; slightly alkaline, pH 7.8; gradual wavy boundary.

Bt1—2 to 11 inches (5 to 28 cm); brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2), moist; 55 percent clay; strong medium and coarse angular blocky structure; very hard, friable, very sticky and very plastic; common very fine and fine roots; common very fine and fine pores; common distinct pressure faces; few distinct clay films on faces of peds, rock fragments, and surfaces along root channels; 5 percent gravel; slightly effervescent; moderately alkaline, pH 8.2; diffuse wavy boundary.

Bt2—11 to 29 inches (28 to 74 cm); brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2), moist; 55 percent clay; strong very coarse subangular blocky and strong medium and coarse angular blocky structure; very hard, firm, very sticky and very plastic; common very fine and fine roots; common very fine and fine pores; common prominent pressure faces; few distinct clay films on faces of peds, rock fragments, and surfaces along root channels; 5 percent gravel; slightly effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

R—29 to 60 inches (74 to 152 cm); basalt bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 45 to 60 percent

Rock fragments: 0 to 10 percent

Effervescent: none to slight

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

A horizon

Hue: 7.5YR

Value: 4 dry, 3 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: clay loam, clay, silty clay

Rock fragments: 0 to 15 percent

Bt horizons

Hue: 7.5YR

Value: 3 to 4 dry, 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay

Rock fragments: 0 to 10 percent

R horizon

Bedrock is basalt or andesite

Kuykendall soils

Taxonomic classification: Clayey, smectitic, thermic Aridic Lithic Argiustolls

Geomorphic position: generally occurs on summits and shoulder slopes

Parent material: clayey alluvium and/or residuum weathered from andesite and/or basalt

Slope: 2 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

Soil Survey of San Carlos Indian Reservation, Arizona

lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover: 30 percent
woody debris: 0 percent
bare soil: 35 percent
rock fragments
fine gravel: 1 percent
medium gravel: 2 percent
coarse gravel: 2 percent
cobble: 15 percent
stone: 20 percent
boulder: 5 percent
Depth to restrictive feature(s): 7 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.00 to 0.06 inches per hour (0.01 to 0.42 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 2.2 (very low)
Shrink-swell potential: about 10.0 LEP (very high)
Flooding hazard: none
Runoff class: medium
Hydrologic group: D
Ecological site name: Volcanic Upland 16-20" p.z.
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.
Ecological site number: R038XB213AZ
Present vegetation: blue grama, sideoats grama, shrubby buckwheat, tobosa, annual grasses, bottlebrush squirreltail, curly mesquite, hairy grama, perennial forbs, prairie junegrass, sacahuista
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,450 feet north and 1,400 feet west of southeast corner of Section 4, Township 2 S, Range 23 E

Geographic Coordinate System:

33° 17' 0.58" north, 109° 59' 12.25" west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/3) gravelly silty clay, dark brown (7.5YR 3/2), moist; 50 percent clay; moderate very fine granular structure; slightly hard, friable, very sticky and very plastic; common very fine roots; many very fine pores; 15 percent stone; noneffervescent; slightly alkaline, pH 7.6; abrupt wavy boundary.

Bt—2 to 15 inches (5 to 38 cm); brown (7.5YR 4/3) clay, dark brown (7.5YR 3/2), moist; 55 percent clay; strong medium and coarse angular blocky structure; extremely hard, very firm, very sticky and very plastic; many very fine and fine and common medium roots in cracks; many very fine and fine pores; very many prominent clay films on faces of peds; 5 percent stone; noneffervescent; slightly alkaline, pH 7.4; very abrupt smooth boundary.

R—15 to 60 inches (38 to 152 cm); basalt bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 40 to 60 percent

Rock fragments: 0 to 30 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

A horizon

Hue: 7.5YR

Value: 3 to 4, dry or moist

Chroma: 2 to 3, dry or moist

Texture: clay loam, silty clay, clay

Rock fragments: 5 to 30 percent

Bt horizons

Hue: 7.5YR

Value: 3 to 4, dry or moist

Chroma: 2 to 3, dry or moist

Texture: clay

Rock fragments: 0 to 30 percent

R horizon

Bedrock is basalt or andesite

26—Cloverdale-Terrarossa complex, 1 to 5 percent slopes

Map Unit Setting

Landform(s): fan terraces (fig. 3)

Elevation: 4,200 to 5,800 feet (1,280 to 1,768 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Cloverdale and similar soils: 65 percent

Terrarossa and similar soils: 20 percent

Minor components: Brewster, Limpia family, and soils that have mollic epipedons thicker than 20 inches occur on slightly higher positions. Soils that have silty surface textures occur on similar positions as Terrarossa soils.

Soil Properties and Qualities

Cloverdale soils

Taxonomic classification: Fine, smectitic, thermic Torrertic Haplustalfs

Geomorphic position: generally occur on toe slopes

Parent material: clayey alluvium derived from volcanic rock

Slope: 1 to 5 percent

Surface cover:

Biological crust

Soil Survey of San Carlos Indian Reservation, Arizona

cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover: 1 percent
woody debris: 0 percent
bare soil: 94 percent
rock fragments
fine gravel: 1 percent
medium gravel: 2 percent
coarse gravel: 2 percent
Drainage class: well drained
Ksat solum: 0.00 to 0.20 inches per hour (0.01 to 1.40 micrometers per second)
Available water capacity total inches: 10.3 (very high)
Shrink-swell potential: about 10.0 LEP (very high)
Flooding hazard: none
Runoff class: medium
Hydrologic group: D
Ecological site name: Clayey Upland 16-20" p.z.
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.



Figure 3.—A typical area of Cloverdale-Terrarosa complex, 1 to 5 percent slopes in the foreground. The Gila Mountains, shown in the background, are mostly Kuykendall-Beaumont-Rock outcrop complex, 5 to 45 percent slopes.

Soil Survey of San Carlos Indian Reservation, Arizona

Ecological site number: R038XB202AZ

Present vegetation: tobosa, prairie junegrass, annual grasses, blue grama, bottlebrush squirreltail, curly mesquite, perennial forbs, sideoats grama, vine mesquite

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,100 feet north and 1,200 feet east of southwest corner of Section 6, Township 2 S, Range 24 E

Geographic Coordinate System:

33° 17' 10.40" north, 109° 55' 40.50" west

A—0 to 3 inches (0 to 8 cm); brown (7.5YR 4/3) clay, dark brown (7.5YR 3/3), moist; 42 percent clay; strong thick platy and moderate medium and coarse subangular blocky parting to moderate very fine and fine granular structure; soft, loose, very sticky and very plastic; many very fine and fine roots; many very fine and fine pores; 5 percent gravel; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

Bt1—3 to 16 inches (8 to 41 cm); brown (7.5YR 5/4) clay, brown (7.5YR 4/4), moist; 41 percent clay; weak fine wedge and moderate medium and coarse subangular blocky structure; hard, friable, very sticky and very plastic; many very fine roots; many very fine pores; few distinct pressure faces; common distinct clay films on faces of peds and few distinct clay films on surfaces along root channels; 10 percent gravel; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt2—16 to 39 inches (41 to 99 cm); brown (7.5YR 5/4) clay, brown (7.5YR 4/4), moist; 43 percent clay; weak medium and coarse subangular blocky structure; extremely hard, very firm, very sticky and very plastic; common very fine roots; common very fine pores; few distinct pressure faces; few faint clay films on faces of peds and few distinct clay films on surfaces along root channels; 12 percent gravel; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Btk—39 to 48 inches (99 to 122 cm); brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4), moist; 35 percent clay; 5 percent fine mottles; moderate medium prismatic structure; extremely hard, extremely firm, very sticky and very plastic; many very fine roots; common very fine pores; common distinct pressure faces; common distinct clay films on faces of peds; 5 percent fine distinct black (7.5YR 2.5/1), iron-manganese concretions; common medium carbonate masses; 10 percent gravel; very slightly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Bssb—48 to 66 inches (122 to 168 cm); light brown (7.5YR 6/4) clay, brown (7.5YR 5/4), moist; 50 percent clay; 10 percent medium mottles; strong fine and medium wedge structure; extremely hard, extremely firm, very sticky and very)plastic; common very fine roots between peds; common very fine pores; few prominent slickensides; many prominent pressure faces; 10 percent fine distinct black (7.5YR 2.5/1), iron-manganese masses on surfaces along root channels; common medium carbonate masses; 2 percent gravel; noneffervescent; slightly alkaline, pH 7.6.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 60 percent

Rock fragments: 1 to 35 percent

Cracks:

Width: 0.5 to 1 inch

Depth: surface to 40 inches

Soil Survey of San Carlos Indian Reservation, Arizona

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2.5 to 4 moist

Chroma: 2 to 4 dry, 2 to 3 moist

Texture: clay, clay loam

Rock fragments: 1 to 15 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 3 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: clay, clay loam

Rock fragments: 1 to 20 percent

Effervescence: none to slight

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

Bssb horizon

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 4 to 5 moist

Chroma: 3 to 6, dry or moist

Texture: clay, clay loam

Rock fragments: 1 to 25 percent

Effervescence: none to violent

Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 9.0)

Cloverdale as used in this mapping unit is a taxadjunct to the series because it does not meet the color and/or thickness requirements for a mollic epipedon. Cloverdale series is Fine, smectitic, thermic Torrertic Argiustolls.

Terrarossa soils

Taxonomic classification: Fine, mixed, superactive, thermic Aridic Paleustalfs

Geomorphic position: generally occur on slightly higher areas of toe slopes

Parent material: alluvium derived from igneous rock

Slope: 1 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 15 percent

woody debris: 0 percent

bare soil: 65 percent

rock fragments

fine gravel: 10 percent

medium gravel: 10 percent

Drainage class: well drained

Ksat solum: 0.06 to 5.95 inches per hour (0.42 to 42.00 micrometers per second)

Available water capacity total inches: 9.5 (high)

Shrink-swell potential: about 7.5 LEP (high)

Soil Survey of San Carlos Indian Reservation, Arizona

Flooding hazard: none

Runoff class: low

Hydrologic group: C

Ecological site name: Loamy Upland 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB209AZ

Present vegetation: blue grama, prairie junegrass, sideoats grama, black grama, shrubby buckwheat, annual grasses, bottlebrush squirreltail, curly mesquite, perennial forbs, perennial grasses, tobosa

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,750 feet north and 1,700 feet east of southwest corner of Section 6, Township 2 S, Range 24 E

Geographic Coordinate System:

33° 17' 2.80" north, 109° 55' 37.30" west

A1—0 to 2 inches (0 to 5 cm); brown (10YR 5/3) loam, dark brown (10YR 3/3), moist; 16 percent clay; moderate thin platy structure; soft, loose, nonsticky and nonplastic; many very fine roots; many very fine pores; 10 percent gravel; noneffervescent; neutral, pH 7.2; very abrupt smooth boundary.

A2—2 to 7 inches (5 to 18 cm); brown (10YR 4/3) loam, brown (7.5YR 4/2), moist; 21 percent clay; moderate medium and coarse subangular blocky structure; moderately hard, friable, nonsticky and nonplastic; many very fine roots; many very fine and fine and few medium pores; 10 percent gravel; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt1—7 to 16 inches (18 to 41 cm); brown (7.5YR 4/3) gravelly clay loam, dark brown (7.5YR 3/2), moist; 36 percent clay; moderate fine and medium subangular blocky structure; hard, firm, moderately sticky and very plastic; many very fine and fine roots between peds; many very fine and few medium pores; few distinct clay films on rock fragments and few distinct clay bridges between sand grains; 20 percent gravel; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt2—16 to 38 inches (41 to 97 cm); strong brown (7.5YR 4/6) clay, brown (7.5YR 4/4), moist; 42 percent clay; strong fine prismatic structure; very hard, very firm, very sticky and very plastic; common very fine roots between peds; many very fine pores; very many prominent clay films on faces of peds and few distinct clay bridges between sand grains; 5 percent medium manganese coatings; 12 percent gravel; noneffervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

2Btb—38 to 42 inches (97 to 107 cm); reddish brown (5YR 5/4) very gravelly clay, reddish brown (5YR 5/4), moist; 47 percent clay; massive; hard, firm, very sticky and very plastic; few very fine roots; common very fine pores; many distinct clay films on rock fragments and few distinct clay bridges between sand grains; 10 percent medium iron-manganese concretions; 40 percent gravel; noneffervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

3Btb—42 to 60 inches (107 to 152 cm); reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4), moist; 39 percent clay; moderate fine prismatic structure; very hard, very firm, very sticky and very plastic; few very fine roots between peds; common very fine pores; very many distinct clay films on faces of peds and few

Soil Survey of San Carlos Indian Reservation, Arizona

distinct clay bridges between sand grains ; 5 percent medium manganese coatings; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 55 percent

Rock fragments: 5 to 35 percent

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: loam, sandy loam

Rock fragments: 5 to 10 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.3)

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2 to 5 moist

Chroma: 2 to 6 dry, 2 to 4 moist

Texture: clay, clay loam, silty clay loam

Rock fragments: 5 to 45 percent

Effervescence: none to very slight

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

27—Coppercan-Rock outcrop complex, 5 to 20 percent slopes

Map Unit Setting

Landform(s): pediments

Elevation: 4,200 to 5,800 feet (1,280 to 1,768 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Coppercan and similar soils: 50 percent

Rock outcrop: 30 percent

Minor components: Cherrycow and Terrarossa soils generally occur on foot slopes.

Soil Properties and Qualities

Coppercan soils

Taxonomic classification: Clayey, mixed, superactive, thermic, shallow Aridic

Argiustolls

Geomorphic position: generally occur on summits and back slopes

Parent material: slope alluvium and/or residuum weathered from conglomerate and/or tuff

Slope: 5 to 20 percent

Soil Survey of San Carlos Indian Reservation, Arizona

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 50 percent

woody debris: 0 percent

bare soil: 15 percent

rock fragments

gravel: 60 percent

Depth to restrictive feature(s): 10 to 20 inches to bedrock, paralithic; 15 to 30 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.06 to 1.98 inches per hour (0.42 to 14.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)

Available water capacity total inches: 1.9 (very low)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: high

Hydrologic group: D

Ecological site name: Clayey Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB215AZ

Present vegetation: sideoats grama, annual grasses, honey mesquite, broom snakeweed, cane beardgrass, perennial forbs, pricklypear, redberry juniper, sacahuista

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,540 feet north and 2,450 feet east of the southwest corner of Section 2, Township 4 S, Range 27 E

Geographic Coordinate System:

33° 6' 37.60" north, 109° 32' 46.50" west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/2) very gravelly sandy clay loam, dark brown (7.5YR 3/2), moist; 22 percent clay; weak fine subangular blocky parting to moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine and common medium and coarse roots; common very fine and fine and common medium and coarse pores; 35 percent gravel; noneffervescent; slightly acid, pH 6.2; clear smooth boundary.

Bt1—2 to 7 inches (5 to 18 cm); brown (7.5YR 4/3) gravelly clay loam, dark brown (7.5YR 3/3), moist; 38 percent clay; moderate fine and medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; common very fine and fine and few medium and coarse roots; common very fine and fine and common medium and coarse pores; common distinct clay films on faces of peds and few

Soil Survey of San Carlos Indian Reservation, Arizona

distinct clay films on rock fragments; 15 percent gravel; noneffervescent; slightly acid, pH 6.2; gradual smooth boundary.

Bt2—7 to 16 inches (18 to 41 cm); brown (7.5YR 5/4) gravelly clay, brown (7.5YR 4/4), moist; 46 percent clay; strong fine and medium angular blocky structure; very hard, very firm, very sticky and very plastic; few very fine and fine and few medium and coarse roots; common very fine and fine and few medium and coarse pores; many distinct clay films on faces of peds and few distinct clay films on rock fragments; 15 percent gravel; noneffervescent; neutral, pH 6.6; clear wavy boundary.

Crt—16 to 25 inches (41 to 64 cm); few very fine and fine roots in cracks; few faint clay films along fractures of bedrock; weathered conglomerate bedrock; gradual wavy boundary.

R—25 to 60 inches (64 to 152 cm); unweathered conglomerate bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 55 percent

Rock fragments: 10 to 35 percent

Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

A horizon

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: sandy clay loam, clay loam

Rock fragments: 10 to 45 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 2.5 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: clay, clay loam

Rock fragments: 10 to 35 percent

Cr and R horizons

Bedrock is soft to hard conglomerate or tuff

Rock outcrop

Slope: 5 to 20 percent

Range in Characteristics

Rock outcrop consists of exposures of barren bedrock that occurs as low outcrops and ledges of Tertiary conglomerate or tuff. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

28—Eloma very gravelly sandy clay loam, 3 to 65 percent slopes

Map Unit Setting

Landform(s): fan terraces

Elevation: 3,000 to 5,000 feet (914 to 1,524 meters)

Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)

Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)

Soil Survey of San Carlos Indian Reservation, Arizona

Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)

Frost-free period: 180 to 230 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-1 Lower Interior Chaparral

Map Unit Composition

Eloma and similar soils: 90 percent

Minor components: Ryallen soils occur on similar positions as Eloma soils. Riverwash occurs in drainageways.

Soil Properties and Qualities

Eloma soils

Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic Ustic Haplargids

Geomorphic position: generally occurs on summits and back slopes

Parent material: mixed clayey-skeletal alluvium

Slope: 3 to 65 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 2 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 55 percent

 woody debris: 0 percent

 bare soil: 8 percent

 rock fragments

 gravel: 60 percent

 cobble: 15 percent

 stone: 5 percent

Drainage class: well drained

Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)

Available water capacity total inches: 4.1 (low)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: C

Ecological site name: Clay Loam Upland 12-16" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA103AZ

Present vegetation: tobosa, annual grasses, perennial forbs, sideoats grama, curly mesquite, jojoba, mesquite, perennial grasses, pricklypear

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,100 feet south and 900 feet east of northwest corner of Section 5, Township 6 S, Range 22 E

Soil Survey of San Carlos Indian Reservation, Arizona

Geographic Coordinate System:

32° 56' 39.52" north, 110° 7' 19.51" west

A—0 to 11 inches (0 to 28 cm); brown (7.5YR 4/2) very gravelly sandy clay loam, dark brown (7.5YR 3/3), moist; 27 percent clay; moderate fine and medium granular structure; hard, firm, moderately sticky and moderately plastic; many very fine and fine roots; many very fine and fine pores; 25 percent gravel and 15 percent cobble; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt1—11 to 33 inches (28 to 84 cm); dark brown (7.5YR 3/3) extremely gravelly clay, dark brown (7.5YR 3/3), moist; 47 percent clay; strong medium and coarse angular blocky structure; hard, firm, very sticky and very plastic; many very fine and fine and common medium roots; common fine and medium pores; very many prominent clay films on faces of peds and rock fragments; 40 percent gravel and 15 percent cobble and 7 percent stone; noneffervescent; neutral, pH 7.2; gradual wavy boundary.

Bt2—33 to 60 inches (84 to 152 cm); brown (7.5YR 4/4) very cobbly clay, brown (7.5YR 4/4), moist; 44 percent clay; strong medium and coarse angular blocky structure; hard, firm, very sticky and very plastic; common very fine and fine roots; common fine and medium pores; many distinct clay films on faces of peds and rock fragments; 30 percent gravel and 15 percent cobble and 5 percent stone; noneffervescent; neutral, pH 7.2.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 55 percent

Rock fragments: 35 to 60 percent

Effervescence: none to slight

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: sandy loam, sandy clay loam, clay loam, clay

Rock fragments: 30 to 60 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 6 dry, 3 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: clay loam, clay, sandy clay

Rock fragments: 35 to 60 percent

29—Eskiminzin and Sontag soils, and Rock outcrop, 0 to 5 percent slopes

Map Unit Setting

Landform(s): mesas

Elevation: 3,000 to 5,000 feet (914 to 1,524 meters)

Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)

Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)

Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)

Frost-free period: 180 to 230 days

Major Land Resource Area: 38-Mogollon Transition

Soil Survey of San Carlos Indian Reservation, Arizona

Land Resource Unit: 38-1 Lower Interior Chaparral

Map Unit Composition

Eskiminzin and similar soils

Sontag and similar soils

Rock outcrop

Minor components: Soils that have less than 35 percent rock fragments in the particle-size control section occur on similar positions as Eskiminzin soils. Fine Petrocalcids soils occur on areas that are moderately deep to bedrock.

This is an undifferentiated map unit. These components are not consistently associated geographically. At least one component is present in every delineation, but each delineation can have any combination of the components.

Soil Properties and Qualities

Eskiminzin soils

Taxonomic classification: Clayey-skeletal, smectitic, thermic Lithic Ustic Haplargids

Geomorphic position: generally occurs near the edges of mesas and slightly higher convex areas where depth to bedrock is less than 20 inches

Parent material: residuum weathered from basalt

Slope: 0 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 50 percent

woody debris: 2 percent

bare soil: 20 percent

rock fragments

gravel: 20 percent

cobble: 20 percent

stone: 15 percent

boulder: 10 percent

Depth to restrictive feature(s): 6 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.00 to 0.06 inches per hour (0.01 to 0.42 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 1.1 (very low)

Shrink-swell potential: about 10.5 LEP (very high)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Volcanic Upland 12-16" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA115AZ

Soil Survey of San Carlos Indian Reservation, Arizona

Present vegetation: tobosa, Mexican sprangletop, curly mesquite, catclaw acacia, pricklypear, redstem filaree, little barley, wild oat, red brome, banana yucca, lupine, mariposa lily

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 250 feet south and 800 feet west of northeast corner of Section 7, Township 1 S, Range 20 E

Geographic Coordinate System:

33° 22' 3.30" north, 110° 19' 47.40" west

A—0 to 3 inches (0 to 8 cm); brown (7.5YR 4/3) very bouldery clay, dark brown (7.5YR 3/3), moist; 45 percent clay; moderate fine and medium subangular blocky parting to moderate very fine wedge structure; very hard, firm, very sticky and very plastic; many very fine and fine roots; many very fine and fine pores; many distinct pressure faces; 15 percent gravel and 10 percent cobble and 10 percent stone and 10 percent boulder; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt—3 to 14 inches (8 to 36 cm); brown (7.5YR 4/2) very bouldery clay, very dark brown (7.5YR 2.5/2), moist; 50 percent clay; strong coarse subangular blocky parting to strong fine and medium subangular blocky structure; very hard, very firm, very sticky and very plastic; common very fine roots; many very fine and fine and few medium pores; common distinct pressure faces; many distinct clay films on rock fragments and surfaces along pores; 15 percent gravel and 10 percent cobble and 10 percent stone and 10 percent boulder; noneffervescent; slightly alkaline, pH 7.4.

R—14 to 60 inches (36 to 152 cm); basalt bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 40 to 60 percent

Rock fragments: 35 to 65 percent

Effervescence: none to slight

Reaction (pH): Neutral to slightly alkaline (6.6 to 7.8)

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay, clay loam

Rock fragments: 35 to 70 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay

Rock fragments: 35 to 65 percent

R horizon

Bedrock is basalt or andesite

Sontag soils

Taxonomic classification: Fine, smectitic, thermic Ustertic Haplargids

Geomorphic position: generally occurs away from edges of mesas and outcroppings of basalt where depth to bedrock is greater than 40 inches

Soil Survey of San Carlos Indian Reservation, Arizona

Parent material: alluvium derived from volcanic rock

Slope: 0 to 5 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 75 percent

 woody debris: 0 percent

 bare soil: 7 percent

 rock fragments

 fine gravel: 15 percent

 medium gravel: 10 percent

 coarse gravel: 10 percent

 cobble: 10 percent

Drainage class: well drained

Ksat solum: 0.00 to 5.95 inches per hour (0.01 to 42.00 micrometers per second)

Available water capacity total inches: 8.3 (high)

Shrink-swell potential: about 10.0 LEP (very high)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Clayey Upland 12-16" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA102AZ

Present vegetation: tobosa, little barley, red brome, Mexican sprangletop, redstem filaree, snakeweed, wild oat, globemallow, cholla, pricklypear, catclaw acacia, whitethorn acacia

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 100 feet north and 800 feet east of southwest corner of Section 5, Township 1 S, Range 20 E

Geographic Coordinate System:

33° 22' 15.50" north, 110° 19' 5.50" west

A—0 to 4 inches (0 to 10 cm); brown (7.5YR 4/3) clay loam, dark brown (7.5YR 3/3), moist; 38 percent clay; strong medium and coarse subangular blocky parting to strong very fine and fine subangular blocky structure; hard, friable, very sticky and very plastic; many very fine and fine and few medium roots; many very fine pores; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.6; clear wavy boundary.

Btss—4 to 40 inches (10 to 102 cm); brown (7.5YR 4/2) clay, dark brown (7.5YR 3/2), moist; 55 percent clay; strong very coarse wedge parting to strong very fine and fine wedge structure; very hard, friable, very sticky and very plastic; many very fine and fine roots; common very fine pores; common slickensides; common prominent pressure faces; few prominent clay films on rock fragments; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

Soil Survey of San Carlos Indian Reservation, Arizona

2Btk1—40 to 55 inches (102 to 140 cm); reddish brown (5YR 5/4) very gravelly clay, reddish brown (5YR 4/4), moist; 40 percent clay; massive; slightly hard, very friable, moderately sticky and moderately plastic; few fine roots; many very fine pores; common prominent clay films on rock fragments and few prominent clay bridges between sand grains; few carbonate coats on rock fragments and surfaces along root channels; 1 percent fine prominent brownish yellow (10YR 6/8), moist, masses of reduced iron and 10 percent fine prominent black (N 2.5/), iron-manganese nodules; 50 percent gravel; strongly effervescent, 3 percent calcium carbonate equivalent; slightly alkaline, pH 7.8; clear wavy boundary.

2Btk2—55 to 68 inches (140 to 173 cm); brown (7.5YR 5/4) very gravelly sandy loam, brown (7.5YR 4/3), moist; 8 percent clay; massive; moderately hard, firm, nonsticky and nonplastic; few fine roots; many very fine pores; common prominent clay films on rock fragments and common prominent clay bridges between sand grains; 1 percent fine prominent brownish yellow (10YR 6/8), moist, masses of reduced iron; many medium and coarse carbonate nodules; 40 percent gravel; strongly effervescent, 8 percent calcium carbonate equivalent; moderately alkaline, pH 8.4.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 40 to 60 percent

Rock fragments: 0 to 10 percent

Cracks:

Width: 0.2 to 2 inches

Depth: surface to 40 inches

Calcium carbonate equivalent: 0 to 8 percent

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay loam, clay

Rock fragments: 5 to 10 percent

Effervescence: none to strong

Reaction (pH): slightly alkaline (7.4 to 7.8)

Bt horizons

Hue: 5YR, 7.5YR, 10YR

Value: 3 to 5 dry, 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay

Rock fragments: 5 to 10 percent

Effervescence: none to violent

Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 9.0)

Btk horizons

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Texture: clay, clay loam and loam, sandy clay loam, sandy loam below
40 inches

Rock fragments: 30 to 60 percent

Effervescence: slight to violent

Reaction (pH): moderately alkaline to strongly alkaline (7.9 to 9.0)

Rock outcrop

Slope: 0 to 5 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops of Tertiary basalt and andesite. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

30—Eskiminzin-Rock outcrop complex, 35 to 65 percent slopes

Map Unit Setting

Landform(s): hills, mountains

Elevation: 3,000 to 5,000 feet (914 to 1,524 meters)

Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)

Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)

Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)

Frost-free period: 180 to 230 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-1 Lower Interior Chaparral

Map Unit Composition

Eskiminzin and similar soils: 50 percent

Rock outcrop: 30 percent

Minor components: Sontag soils occur on concave back slopes and foot slopes.

Lampshire and Pantak soils occur on eroded areas. Argic Petrocalcids and

Calciargids occur on similar positions as Eskiminzin.

Soil Properties and Qualities

Eskiminzin soils

Taxonomic classification: Clayey-skeletal, smectitic, thermic Lithic Ustic

Haplargids

Geomorphic position: generally occurs on back slopes

Parent material: residuum weathered from basalt

Slope: 35 to 65 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 1 percent

bare soil: 27 percent

rock fragments

gravel: 25 percent

cobble: 20 percent

stone: 10 percent

Depth to restrictive feature(s): 6 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.00 to 0.20 inches per hour (0.01 to 1.40 micrometers per second)

Soil Survey of San Carlos Indian Reservation, Arizona

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 1.2 (very low)

Shrink-swell potential: about 10.5 LEP (very high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Volcanic Hills 12-16" p.z. Clayey

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA117AZ

Present vegetation: sideoats grama, tobosa, annual grasses, canotia, curly mesquite, jojoba, oneseed juniper, perennial forbs, perennial grasses, pricklypear, tanglehead, whitethorn acacia

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 225 feet south and 1,915 feet east of the northwest corner of Section 23, Township 5 S, Range 16 E

Geographic Coordinate System:

32° 59' 24.00" north, 110° 41' 0.00" west

A—0 to 1 inch (0 to 3 cm); brown (7.5YR 4/3) very cobbly clay loam, dark brown (7.5YR 3/3), moist; 35 percent clay; strong fine and medium granular structure; slightly hard, very friable, very sticky and very plastic; many very fine and fine roots; many very fine and fine pores; 15 percent gravel and 35 percent cobble; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt—1 to 14 inches (3 to 36 cm); brown (7.5YR 4/4) very cobbly clay, brown (7.5YR 4/4), moist; 55 percent clay; strong fine and medium angular blocky structure; hard, firm, very sticky and very plastic; many very fine and fine and common medium roots; common very fine and fine pores; many distinct clay films on faces of peds and few distinct clay films on rock fragments; 15 percent gravel and 35 percent cobble; noneffervescent; slightly alkaline, pH 7.4; clear wavy boundary.

R—14 to 60 inches (36 to 152 cm); basalt bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 55 percent

Rock fragments: 35 to 65 percent

Effervescence: none to slight

Reaction (pH): Neutral to slightly alkaline (6.6-7.8)

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: loam, silty clay loam, clay loam, clay

Rock fragments: 35 to 70 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2 to 4 moist

Chroma: 2 to 4, dry or moist
Texture: clay loam, clay
Rock fragments: 35 to 65 percent

R horizon

Bedrock is basalt or andesite

Rock outcrop

Slope: 35 to 75 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops and ledges of Tertiary basalt. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

31—Eskiminzin-Sontag-Rock outcrop complex, 2 to 45 percent slopes

Map Unit Setting

Landform(s): hills

Elevation: 2,500 to 4,500 feet (762 to 1,372 meters)

Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)

Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)

Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)

Frost-free period: 180 to 230 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-1 Lower Interior Chaparral

Map Unit Composition

Eskiminzin and similar soils: 55 percent

Sontag and similar soils: 20 percent

Rock outcrop: 15 percent

Minor components: Soils that have less than 35 percent rock fragments in the particle-size control section occur on similar positions as Eskiminzin soils. Pantak soils occur on erosional areas. Riverwash occurs in drainageways.

Soil Properties and Qualities

Eskiminzin soils

Taxonomic classification: Clayey-skeletal, smectitic, thermic Lithic Ustic Haplargids

Geomorphic position: generally occurs on back slopes

Parent material: residuum weathered from basalt

Slope: 10 to 45 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 40 percent

Soil Survey of San Carlos Indian Reservation, Arizona

woody debris: 0 percent
bare soil: 27 percent
rock fragments
 gravel: 20 percent
 cobble: 30 percent
 stone: 15 percent
Depth to restrictive feature(s): 6 to 12 inches to bedrock, paralithic; 6 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.00 to 1.98 inches per hour (0.01 to 14.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 0.6 (very low)
Shrink-swell potential: about 10.5 LEP (very high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Volcanic Hills 12-16" p.z. Clayey
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.
Ecological site number: R038XA117AZ
Present vegetation: sideoats grama, tobosa, annual grasses, whitethorn, canotia, curly mesquite, jojoba, oneseed juniper, perennial forbs, pricklypear, tanglehead
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,600 feet north and 2,225 feet east of southwest corner of Section 29, Township 5 S, Range 17 E

Geographic Coordinate System:

32° 58' 8.00" north, 110° 37' 52.54" west

A—0 to 3 inches (0 to 7 cm); dark brown (7.5YR 3/3) extremely cobbly loam, dark brown (7.5YR 3/2), moist; 23 percent clay; strong fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine pores; 35 percent gravel and 30 percent cobble and 3 percent stone; noneffervescent; slightly alkaline, pH 7.8; clear wavy boundary.

Bt—3 to 9 inches (7 to 22 cm); brown (7.5YR 4/3) very gravelly clay, dark brown (7.5YR 3/3), moist; 55 percent clay; strong medium and coarse angular blocky structure; hard, firm, very sticky and very plastic; many very fine and fine roots; many very fine and fine pores; many prominent pressure faces; many continuous, distinct clay films on faces of peds and rock fragments; 39 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Cr—9 to 11 inches (22 to 28 cm); weathered basalt bedrock; clear wavy boundary.

R—11 to 60 inches (28 to 152 cm); basalt bedrock.

Range in Characteristics

Particle-size control section (weighted average)

 Clay content: 35 to 55 percent

 Rock fragments: 35 to 65 percent

Effervescence: none to slight

Soil Survey of San Carlos Indian Reservation, Arizona

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

A horizon

Hue: 7.5YR, 10YR
Value: 3 to 5 dry, 2 to 4 moist
Chroma: 2 to 3, dry or moist
Texture: loam, silty clay loam, clay loam, clay
Rock fragments: 35 to 70 percent

Bt horizons

Hue: 5YR, 7.5YR
Value: 3 to 5 dry, 2 to 3 moist
Chroma: 2 to 4, dry or moist
Texture: clay loam, clay, silty clay
Rock fragments: 35 to 65 percent

Cr horizon (where present)

Weathered basalt or andesite bedrock that is less than 4 inches thick

R horizon

Hard basalt or andesite bedrock

Sontag soils

Taxonomic classification: Fine, smectitic, thermic Ustertic Haplargids

Geomorphic position: generally occurs on summits and shoulder slopes

Parent material: alluvium and/or residuum weathered from basalt

Slope: 2 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent

Chemical crust

salt: 0 percent
gypsum: 0 percent

Physical cover

canopy plant cover: 35 percent
woody debris: 0 percent
bare soil: 40 percent
rock fragments
gravel: 30 percent
cobble: 5 percent
stone: 1 percent

Depth to restrictive feature(s): 45 to 60 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.00 to 0.06 inches per hour (0.01 to 0.42 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 7.2 (high)

Shrink-swell potential: about 10.0 LEP (very high)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Clayey Upland 12-16" p.z.

Soil Survey of San Carlos Indian Reservation, Arizona

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA102AZ

Present vegetation: tobosa, annual grasses, bottlebrush squirreltail, vine mesquite

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,850 feet south and 375 feet east of northwest corner of Section 29, Township 5 S, Range 17 E

Geographic Coordinate System:

32° 58' 16.19" north, 110° 38' 14.38" west

A—0 to 7 inches (0 to 18 cm); brown (7.5YR 4/3) clay, brown (7.5YR 4/3), moist; 52 percent clay; strong fine and medium subangular blocky structure; hard, firm, very sticky and very plastic; many very fine and fine roots; many very fine and fine pores; violently effervescent; moderately alkaline, pH 8.2; gradual wavy boundary.

Bt—7 to 48 inches (18 to 122 cm); brown (7.5YR 4/3) clay, brown (7.5YR 4/3), moist; 58 percent clay; strong medium and coarse angular blocky structure; hard, firm, very sticky and very plastic; common fine roots; many very fine and fine pores; many prominent pressure faces; common discontinuous distinct clay films on faces of peds; violently effervescent; strongly alkaline, pH 8.5; abrupt wavy boundary.

R—48 to 60 inches (122 to 152 cm); basalt bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 40 to 60 percent

Rock fragments: 0 to 10 percent

Cracks:

Width: 0.2 to 1 inches

Depth: surface to 30 inches

Effervescence: none to violent

Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 9.0)

A horizon

Hue: 5YR, 7.5YR

Value: 2 to 5 dry, 2 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: silty clay loam, clay, clay loam

Rock fragments: 0 to 10 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: clay loam, clay, silty clay

Rock fragments: 0 to 10 percent

R horizon

Bedrock is basalt or andesite

Rock outcrop

Slope: 15 to 45 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops and ledges of Tertiary basalt. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

32—Ess-Pocomate family association, 20 to 70 percent slopes

Map Unit Setting

Landform(s): mountains

Elevation: 6,600 to 8,500 feet (2,012 to 2,591 meters)

Mean annual precipitation: 18 to 28 inches (457 to 711 millimeters)

Mean annual air temperature: 39 to 57 degrees F (4.0 to 13.9 degrees C)

Mean annual soil temperature: 41 to 59 degrees F (5.1 to 15.0 degrees C)

Frost-free period: 70 to 180 days

Major Land Resource Area: 39-Arizona and New Mexico Mountains

Land Resource Unit: 39-1 Mogollon Plateau Coniferous Forests

Map Unit Composition

Ess and similar soils: 50 percent

Pocomate family and similar soils: 30 percent

Minor components: Soils that have mollic epipedons less than 20 inches thick generally occur on south and/or west facing aspects. Small areas of Rock outcrop occur as short ledges throughout the unit.

Soil Properties and Qualities

Ess soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, frigid Pachic Argiustolls

Geomorphic position: generally occurs on north and/or east facing back slopes

Parent material: loamy-skeletal colluvium and/or slope alluvium derived from volcanic rock

Slope: 20 to 70 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

tree canopy cover: 60 percent

plant cover: 25 percent

organic litter: 20 percent

woody debris: 3 percent

bare soil: 20 percent

rock fragments

gravel: 20 percent

cobble: 10 percent

stone: 2 percent

Drainage class: well drained

Soil Survey of San Carlos Indian Reservation, Arizona

Ksat solum: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 6.0 (moderate)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: very high

Hydrologic group: C

Ecological site name: Pinus ponderosa-Quercus gambelii/Robinia neomexicana/
Muhlenbergia montana-Blepharoneuron tricholepis

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F039XA135AZ

Present vegetation: ponderosa pine, Gambel oak, Douglas-fir, New Mexico locust, alligator juniper, mountain muhly, perennial forbs

Land capability (non irrigated): 5c

Typical Profile

Location

Public Land Survey: 685 feet south and 1,890 feet east of the northwest corner of Section 27, Township 3 N, Range 27 E

Geographic Coordinate System:

33° 34' 48.00" north, 109° 31' 21.80" west

Oi—0 to 1 inch (0 to 2 cm) slightly decomposed plant material; 1 percent clay; moderately acid, pH 6.0; abrupt smooth boundary.

A—1 to 3.5 inches (2 to 9 cm); brown (7.5YR 5/2) very cobbly loam, dark brown (7.5YR 3/2), moist; 23 percent clay; moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine pores; 25 percent gravel and 20 percent cobble and 2 percent stone; noneffervescent; moderately acid, pH 6.0; clear smooth boundary.

Bt1—3.5 to 19 inches (9 to 48 cm); brown (7.5YR 4/3) very cobbly clay loam, dark brown (7.5YR 3/3), moist; 32 percent clay; moderate medium and coarse subangular blocky parting to moderate medium granular structure; slightly hard, friable, moderately sticky and moderately plastic; common very fine and fine and few medium and coarse roots; many very fine and fine pores; common faint clay films on faces of peds and rock fragments; 25 percent gravel and 20 percent cobble and 2 percent stone; noneffervescent; slightly acid, pH 6.2; gradual smooth boundary.

Bt2—19 to 33 inches (48 to 84 cm); dark grayish brown (10YR 4/2) very cobbly clay loam, very dark grayish brown (10YR 3/2), moist; 34 percent clay; weak coarse prismatic parting to moderate medium and coarse subangular blocky structure; hard, firm, moderately sticky and moderately plastic; few very fine and fine and few medium and coarse roots; many very fine and fine pores; common faint clay films on faces of peds and rock fragments; 18 percent gravel and 15 percent cobble and 2 percent stone; noneffervescent; slightly acid, pH 6.4; clear wavy boundary.

Bt3—33 to 51 inches (84 to 130 cm); brown (7.5YR 4/3) very cobbly clay loam, dark brown (7.5YR 3/3), moist; 38 percent clay; weak coarse prismatic parting to moderate medium and coarse subangular blocky structure; hard, firm, moderately sticky and moderately plastic; few very fine and fine and few medium and coarse roots; common very fine and fine pores; few faint clay films on faces of peds and rock fragments; 15 percent gravel and 25 percent cobble and 15 percent stone; noneffervescent; slightly acid, pH 6.2; gradual wavy boundary.

BC—51 to 61 inches (130 to 155 cm); brown (7.5YR 5/4) very cobbly clay loam,

Soil Survey of San Carlos Indian Reservation, Arizona

brown (7.5YR 4/4), moist; 32 percent clay; moderate medium and coarse subangular blocky structure; hard, friable, moderately sticky and moderately plastic; few very fine and fine and few medium and coarse roots; common very fine and fine pores; 1 percent fine iron-manganese masses; 15 percent gravel and 25 percent cobble and 15 percent stone; noneffervescent; slightly acid, pH 6.2.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 18 to 35 percent

Rock fragments: 35 to 90 percent

Effervescence: none

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: loam, clay loam

Rock fragments: 25 to 60 percent

Reaction (pH): moderately acid to neutral (5.6 to 7.3)

Bt horizons

Hue: 5YR, 10YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 2 to 4, dry or moist

Texture: loam, clay loam, sandy clay loam

Rock fragments: 35 to 90 percent

Reaction (pH): slightly acid to slightly alkaline (6.1 to 7.8)

BC horizon

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 3 to 4, dry or moist

Texture: loam, clay loam, sandy clay loam

Rock fragments: 35 to 90 percent

Reaction (pH): slightly acid to slightly alkaline (6.1 to 7.8)

Ess as used in this mapping unit is a taxadjunct to the series because it has a mollic epipedon that is more than 20 inches thick. Ess series is Loamy-skeletal, mixed, superactive, frigid Typic Argiustolls.

Pocomate family soils

Series and series family designations are naming expedients and equal.

Taxonomic classification: Loamy-skeletal, mixed, superactive, mesic Lithic Argiustolls

Geomorphic position: generally occurs on south and/or west facing back slopes

Parent material: loamy-skeletal residuum weathered from basalt and/or volcanic rock

Slope: 20 to 70 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

tree canopy cover: 30 percent

Soil Survey of San Carlos Indian Reservation, Arizona

plant cover: 25 percent
organic litter: 15 percent
woody debris: 2 percent
bare soil: 12 percent
rock fragments
 gravel: 15 percent
 cobble: 20 percent
 stone: 10 percent
 boulder: 1 percent

Depth to restrictive feature(s): 7 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 1.1 (very low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Pinus ponderosa-Quercus grisea/Bouteloua curtipendula-Poa fendleriana

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F038XC315AZ

Present vegetation: ponderosa pine, gray oak, alligator juniper, twoneedle pinyon, alderleaf mountain-mahogany, bullgrass, bottlebrush squirreltail, perennial forbs

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,270 feet south and 70 feet east of the northwest corner of Section 30, Township 3 N, Range 27 E

Geographic Coordinate System:

33° 34' 42.16" north, 109° 34' 48.89" west

Oi—0 to 1 inch (0 to 2 cm) slightly decomposed plant material; 1 percent clay; neutral, pH 6.6; abrupt smooth boundary.

A—1 to 3 inches (2 to 8 cm); brown (7.5YR 5/2) very gravelly loam, dark brown (7.5YR 3/2), moist; 26 percent clay; weak fine subangular blocky parting to moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine pores; 30 percent gravel and 10 percent cobble and 5 percent stone; noneffervescent; neutral, pH 6.6; clear smooth boundary.

Bt—3 to 12 inches (8 to 30 cm); brown (7.5YR 4/2) very gravelly clay loam, dark brown (7.5YR 3/2), moist; 33 percent clay; moderate medium and coarse subangular blocky structure; very hard, firm, moderately sticky and moderately plastic; common very fine and fine and few medium roots; many very fine and fine pores; common faint clay films on faces of peds and rock fragments; 30 percent gravel and 10 percent cobble and 5 percent stone; noneffervescent; neutral, pH 6.6; clear wavy boundary.

R—12 to 60 inches (30 to 152 cm); basalt bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 18 to 35 percent

Rock fragments: 45 to 80 percent

Effervescence: none

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: loam, clay loam

Rock fragments: 25 to 85 percent

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: loam, clay loam, sandy clay loam

Rock fragments: 35 to 85 percent

Reaction (pH): slightly acid to moderately alkaline (6.1 to 8.4)

R horizon

Bedrock is basalt or other volcanic rock

33—Frazwell family-Riverwash complex, 0 to 2 percent slopes

Map Unit Setting

Landform(s): flood plains

Elevation: 5,800 to 6,500 feet (1,768 to 1,981 meters)

Mean annual precipitation: 18 to 24 inches (457 to 610 millimeters)

Mean annual air temperature: 45 to 57 degrees F (7.0 to 13.9 degrees C)

Mean annual soil temperature: 47 to 59 degrees F (8.1 to 15.0 degrees C)

Frost-free period: 120 to 180 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-3 Interior Chaparral-Forests

Map Unit Composition

Frazwell family and similar soils: 80 percent

Riverwash: 10 percent

Minor components: Soils that have greater than 35 percent clay content in the particle-size control section and Oxyaquic Ustifluvents soils occur along small, frequently flooded drainageways.

Soil Properties and Qualities

Frazwell family soils

Series and series family designations are naming expedients and equal.

Taxonomic classification: Fine-loamy, mixed, superactive, mesic Cumulic

Haplustolls

Geomorphic position: generally occurs on higher benches that border drainageways

Parent material: fine-loamy alluvium derived from volcanic rock

Soil Survey of San Carlos Indian Reservation, Arizona

Slope: 0 to 2 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 83 percent

 woody debris: 0 percent

 bare soil: 15 percent

 rock fragments

 fine gravel: 2 percent

Drainage class: well drained

Ksat solum: 0.57 to 1.98 inches per hour (4.00 to 14.00 micrometers per second)

Available water capacity total inches: 9.6 (high)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: rare

Runoff class: low

Hydrologic group: B

Ecological site name: Loamy Swale 20-24" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XC308AZ

Present vegetation: perennial forbs, mat muhly, deergrass

Land capability (irrigated): 2w

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 750 feet south and 1,550 feet east of northwest corner of Section 35, Township 1 N, Range 25 E

Geographic Coordinate System:

33° 23' 27.10" north, 109° 42' 50.80" west

A1—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/3) loam, dark brown (7.5YR 3/2), moist; 18 percent clay; weak fine and medium subangular blocky parting to moderate fine and medium granular and moderate thin platy structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine pores; 1 percent gravel; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

A2—2 to 27 inches (5 to 69 cm); brown (7.5YR 4/3) loam, dark brown (7.5YR 3/2), moist; 20 percent clay; moderate medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine pores; 1 percent gravel; noneffervescent; slightly alkaline, pH 7.4; diffuse irregular boundary.

Bw—27 to 60 inches (69 to 152 cm); brown (7.5YR 4/3) loam, dark brown (7.5YR 3/2), moist; 26 percent clay; weak coarse prismatic structure; slightly hard, very friable, slightly sticky and moderately plastic; few very fine and fine roots; many very fine and fine pores; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.6.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 18 to 35 percent

Rock fragments: 0 to 15 percent

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: loam, silt loam

Rock fragments: 0 to 10 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Bw or BC horizons

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 3 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: loam, clay loam, fine sandy loam

Rock fragments: 0 to 15 percent

Effervescence: none to slight

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

Riverwash

Slope: 0 to 2 percent

Range in Characteristics

Riverwash consists of stratified sands, gravels, and cobbles from numerous sources. This material is part of a dynamic system of braided bars and channels. This material is not stable and is subject to shifting and sorting. It is usually dry but can be transformed into a temporary water course or a short-lived torrent after a heavy rain within the watershed. In very wet years, surface water can cover Riverwash for part of the year. Riverwash does not usually support vegetation because the material is constantly shifted and scoured.

34—Frye gravelly loam, 0 to 3 percent slopes

Map Unit Setting

Landform(s): fan terraces

Elevation: 2,500 to 3,800 feet (762 to 1,158 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 60 to 67 degrees F (15.6 to 19.4 degrees C)

Mean annual soil temperature: 62 to 69 degrees F (16.7 to 20.5 degrees C)

Frost-free period: 190 to 250 days

Major Land Resource Area: 41-Southeastern Arizona Basin and Range

Land Resource Unit: 41-2 Chihuahuan-Sonoran Desert Shrub Mix

Map Unit Composition

Frye and similar soils: 80 percent

Minor components: Bylas soils and soils that have more than 35 percent rock fragments occur on similar positions as Frye. Rock outcrop occurs on slightly higher positions. Queen creek soils and Riverwash occur in drainageways.

Soil Properties and Qualities

Frye soils

Taxonomic classification: Fine, mixed, superactive, thermic Typic Argidurids

Geomorphic position: generally occurs on summits of fan terraces that overlie lacustrine sediments

Parent material: mixed alluvium over Pliocene and Pleistocene age lacustrine deposits

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

woody debris: 2 percent

bare soil: 20 percent

rock fragments

fine gravel: 15 percent

medium gravel: 20 percent

coarse gravel: 10 percent

cobble: 15 percent

Depth to restrictive feature(s): 7 to 51 inches to duripan; 39 to 60 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.06 to 1.98 inches per hour (0.42 to 14.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.60 inches per hour (0.00 to 4.20 micrometers per second)

Available water capacity total inches: 4.4 (low)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Loamy Upland 8-12" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R041XB210AZ

Present vegetation: creosotebush, whitethorn, annual grasses, mesquite, perennial grasses, tobosa, ephedra, jojoba, threeawn

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 375 feet south and 2,400 feet east of northwest corner of Section 28, Township 2 S, Range 21 E

Geographic Coordinate System:

33° 14' 8.64" north, 110° 11' 57.28" west

Soil Survey of San Carlos Indian Reservation, Arizona

A—0 to 3 inches (0 to 8 cm); brown (7.5YR 4/4) gravelly loam, brown (7.5YR 4/3), moist; 25 percent clay; weak very thick platy parting to strong very fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine pores; 20 percent gravel; noneffervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Bt1—3 to 20 inches (8 to 51 cm); reddish brown (5YR 5/4) clay, reddish brown (5YR 4/3), moist; 42 percent clay; strong coarse angular blocky and strong fine and medium subangular blocky structure; hard, firm, very sticky and very plastic; many very fine roots; many very fine pores; many distinct clay films on faces of peds and rock fragments; 10 percent gravel; very slightly effervescent; moderately alkaline, pH 8.4; gradual wavy boundary.

Bt2—20 to 26 inches (51 to 66 cm); reddish brown (5YR 5/4) clay, reddish brown (5YR 4/3), moist; 45 percent clay; strong medium and coarse subangular blocky structure; very hard, firm, very sticky and very plastic; few very fine roots; common very fine pores; common distinct pressure faces; many distinct clay films on faces of peds and rock fragments; 5 percent gravel and 1 percent cobble; slightly effervescent; moderately alkaline, pH 8.4; abrupt wavy boundary.

2Btk—26 to 36 inches (66 to 91 cm); yellowish red (5YR 5/6) extremely gravelly clay loam, yellowish red (5YR 5/6), moist; 30 percent clay; massive; slightly hard, friable, moderately sticky and moderately plastic; common very fine and fine and few medium roots; common very fine pores; common distinct clay films on rock fragments; many prominent carbonate coats on rock fragments; few fine carbonate masses; 55 percent gravel and 5 percent cobble; violently effervescent; moderately alkaline, pH 8.4; abrupt wavy boundary.

3Bkqm—36 to 42 inches (91 to 107 cm); cemented material, duripan.

R—42 to 60 inches (107 to 152 cm); lacustrine limestone bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 40 to 55 percent

Rock fragments: 2 to 20 percent

Calcium carbonate equivalent: 0 to 15 percent

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 4 dry, 2 to 4 moist

Texture: loam, clay loam, clay

Rock fragments: 5 to 20 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 6 moist

Chroma: 2 to 4 dry, 2 to 6 moist

Texture: clay, clay loam

Rock fragments: 2 to 15 percent

Effervescence: none to slight

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

Btk horizons

Hue: 5YR, 7.5YR

Soil Survey of San Carlos Indian Reservation, Arizona

Value: 4 to 6, dry or moist
Chroma: 2 to 6 dry, 4 to 6 moist
Texture: clay, clay loam
Rock fragments: 10 to 60 percent
gypsum: 0 to 5 percent
Effervescence: slight to violent
Reaction (pH): moderately alkaline to strongly alkaline (7.9 to 9.0)

Bkqm horizon

Depth to duripan: 7 to 36 inches
Thickness of duripan: 5 to 15 inches
Indurated and fractured duripan with laminar cap that is cemented with silicates and carbonates

R horizon

Bedrock is lacustrine limestone

35—Gavilan family-Sponiker complex, 1 to 25 percent slopes

Map Unit Setting

Landform(s): fan terraces
Elevation: 5,800 to 7,200 feet (1,768 to 2,195 meters)
Mean annual precipitation: 18 to 24 inches (457 to 610 millimeters)
Mean annual air temperature: 45 to 57 degrees F (7.0 to 13.9 degrees C)
Mean annual soil temperature: 47 to 59 degrees F (8.1 to 15.0 degrees C)
Frost-free period: 120 to 180 days
Major Land Resource Area: 38-Mogollon Transition
Land Resource Unit: 38-3 Interior Chaparral-Forests

Map Unit Composition

Gavilan family and similar soils: 50 percent
Sponiker and similar soils: 40 percent
Minor components: Bigprairie soils occur on less sloping summits. Broliar soils occur on slightly higher areas. Frazwell family soils occur on lower drainageways.

Soil Properties and Qualities

Gavilan family soils

Series and series family designations are naming expedients and equal.
Taxonomic classification: Clayey-skeletal, mixed, superactive, mesic Typic Argiustolls
Geomorphic position: generally occurs on shoulders and back slopes
Parent material: gravelly alluvium derived from volcanic rock
Slope: 1 to 25 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent

Soil Survey of San Carlos Indian Reservation, Arizona

gypsum: 0 percent
Physical cover
tree canopy cover: 50 percent
plant cover: 15 percent
woody debris: 5 percent
bare soil: 15 percent
rock fragments
gravel: 60 percent
cobble: 5 percent
Drainage class: well drained
Ksat solum: 0.06 to 1.98 inches per hour (0.42 to 14.00 micrometers per second)
Available water capacity total inches: 4.5 (low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: high
Hydrologic group: C
Ecological site name: Pinus ponderosa-Quercus grisea/Bouteloua curtipendula-Poa fendleriana
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.
Ecological site number: F038XC315AZ
Present vegetation: ponderosa pine, gray oak, alligator juniper, sideoats grama, blue grama, bullgrass, muttongrass, perennial forbs
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 640 feet south and 1,590 feet west of northeast corner of Section 31, Township 1 N, Range 25 E

Geographic Coordinate System:

33° 23' 29.90" north, 109° 46' 34.00" west

A—0 to 3 inches (0 to 7 cm); dark brown (7.5YR 3/2) gravelly loam, black (7.5YR 2.5/1), moist; 14 percent clay; moderate fine and medium subangular blocky parting to moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and few medium roots; many very fine and fine pores; 25 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt1—3 to 10.5 inches (7 to 27 cm); dark brown (7.5YR 3/2) very gravelly clay loam, very dark brown (7.5YR 2.5/2), moist; 28 percent clay; moderate medium and coarse subangular blocky structure; very hard, very firm, very sticky and very plastic; common very fine and fine and common medium and coarse roots; common very fine and fine pores; common prominent clay films on rock fragments; 30 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt2—10.5 to 18 inches (27 to 46 cm); brown (7.5YR 4/4) very gravelly clay, dark brown (7.5YR 3/4), moist; 50 percent clay; moderate medium and coarse subangular blocky structure; very hard, extremely firm, very sticky and very plastic; common very fine and fine and few medium and coarse roots; few very fine and fine and few medium pores; common prominent pressure faces; many prominent clay films on faces of peds and rock fragments; 35 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt3—18 to 48 inches (46 to 122 cm); brown (7.5YR 5/4) extremely gravelly sandy

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clay loam, dark brown (7.5YR 3/4), moist; 32 percent clay; weak fine and medium subangular blocky structure; very hard, very firm, very sticky and very plastic; common very fine and fine and few medium and coarse roots; many very fine and fine pores; few distinct clay films on rock fragments; few distinct carbonate coats on bottom surfaces of rock fragments; 65 percent gravel and 15 percent cobble; noneffervescent; neutral, pH 7.2; gradual wavy boundary.

B_{Ck}—48 to 64 inches (122 to 163 cm); brown (7.5YR 5/4) extremely gravelly sandy clay loam, brown (7.5YR 4/4), moist; 22 percent clay; weak fine and medium subangular blocky structure; hard, firm, slightly sticky and slightly plastic; few very fine and fine roots; many very fine and fine pores; few distinct carbonate coats on bottom surfaces of rock fragments; 50 percent gravel and 15 percent cobble; slightly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 60 percent

Rock fragments: 35 to 80 percent

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: loam, clay loam

Rock fragments: 5 to 60 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

B_t or B_{tk} horizons

Hue: 5YR, 10YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 2 to 6, dry or moist

Texture: clay, clay loam, sandy clay loam

Rock fragments: 15 to 80 percent

Effervescence: none to slight

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

B_k or B_{Ck} horizons

Hue: 5YR, 7.5YR

Value: 5 to 7 dry, 4 to 7 moist

Chroma: 2 to 4, dry or moist

Texture: clay loam, sandy clay loam

Rock fragments: 35 to 80 percent

Effervescence: none to slight

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

Sponiker soils

Taxonomic classification: Fine, smectitic, mesic Pachic Argiustolls

Geomorphic position: generally occurs on summits and shoulder slopes

Parent material: clayey alluvium derived from volcanic rock

Slope: 1 to 25 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Soil Survey of San Carlos Indian Reservation, Arizona

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

tree canopy cover: 0 percent

plant cover: 50 percent

woody debris: 0 percent

bare soil: 10 percent

rock fragments

gravel: 30 percent

cobble: 5 percent

stone: 5 percent

Drainage class: well drained

Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)

Available water capacity total inches: 5.1 (moderate)

Shrink-swell potential: about 10.5 LEP (very high)

Flooding hazard: none

Runoff class: high

Hydrologic group: D

Ecological site name: Clay Loam Upland 20-24" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XC303AZ

Present vegetation: blue grama, sideoats grama, bottlebrush squirreltail, perennial forbs, prairie Junegrass, western wheatgrass, ring muhly, threeawn

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,300 feet south and 490 feet east of northwest corner of Section 17, Township 1 N, Range 26 E

Geographic Coordinate System:

33° 25' 50.10" north, 109° 39' 56.50" west

A—0 to 4 inches (0 to 10 cm); brown (7.5YR 4/2) gravelly clay loam, very dark brown (7.5YR 2.5/2), moist; 38 percent clay; moderate fine and medium subangular blocky parting to moderate fine and medium granular structure; moderately hard, friable, very sticky and very plastic; many very fine and fine roots; many very fine and fine pores; few distinct clay films on rock fragments; 20 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 7.2; gradual wavy boundary.

Bt1—4 to 23 inches (10 to 59 cm); dark reddish brown (5YR 3/3) gravelly clay, (5YR 2.5/3), moist; 55 percent clay; strong medium and coarse angular blocky structure; extremely hard, very firm, very sticky and very plastic; many very fine and fine roots around fragments and many very fine and fine roots between peds; many very fine and fine and common medium pores; common distinct pressure faces; common distinct clay films on faces of peds and rock fragments; 15 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt2—23 to 40 inches (59 to 102 cm); reddish brown (5YR 5/4) very gravelly clay, reddish brown (5YR 4/4), moist; 47 percent clay; moderate fine and medium angular blocky structure; extremely hard, extremely firm, very sticky and very plastic; common very fine and fine roots; many very fine and fine pores; few distinct pressure faces; few distinct clay films on faces of peds and many prominent clay films on rock

fragments; 40 percent gravel and 5 percent cobble; very slightly effervescent; slightly alkaline, pH 7.4; gradual wavy boundary.

Btk—40 to 62 inches (102 to 157 cm); brown (7.5YR 5/4) extremely gravelly clay, brown (7.5YR 4/4), moist; 43 percent clay; weak fine and medium subangular blocky structure; extremely hard, very firm, very sticky and very plastic; common very fine and fine roots; common very fine and fine pores; common distinct clay films on rock fragments; few distinct carbonate coats on rock fragments; common medium carbonate masses; 60 percent gravel and 10 percent cobble; strongly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 60 percent

Coarse fragments: 1 to 35 percent

Cracks:

Width: 0 to 1 inch

Depth: surface to 30 inches

A horizon

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: loam, clay loam

Rock fragments: 2 to 25 percent

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Upper Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: clay loam, silty clay loam, silty clay, clay

Rock fragments: 2 to 35 percent

Effervescence: none to slight

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Lower Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 6, dry or moist

Texture: loam, clay loam, silty clay loam, silty clay, clay

Rock fragments: 2 to 60 percent

Effervescence: none to strong

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

36—Glendale-Gila complex, 0 to 3 percent slopes

Map Unit Setting

Landform(s): flood plains

Elevation: 2,500 to 3,600 feet (762 to 1,097 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 60 to 67 degrees F (15.6 to 19.4 degrees C)

Mean annual soil temperature: 62 to 69 degrees F (16.7 to 20.5 degrees C)

Frost-free period: 190 to 250 days

Soil Survey of San Carlos Indian Reservation, Arizona

Major Land Resource Area: 41-Southeastern Arizona Basin and Range

Land Resource Unit: 41-2 Chihuahuan-Sonoran Desert Shrub Mix

Map Unit Composition

Glendale and similar soils: 60 percent

Gila and similar soils: 30 percent

Minor components: Agustin, Anthony, and Torrifluvents soils occur at borders of the flood plain away from the stream channel. Vertic Torrifluvents soils occur on similar areas near San Carlos Reservoir.

Soil Properties and Qualities

Glendale soils

Taxonomic classification: Fine-silty, mixed, superactive, calcareous, thermic Typic Torrifluvents

Geomorphic position: generally occurs on high benches along large drainageways

Parent material: mixed fine-silty alluvium

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

woody debris: 0 percent

bare soil: 40 percent

rock fragments

gravel: 20 percent

Drainage class: well drained

Ksat solum: 0.57 to 5.95 inches per hour (4.00 to 42.00 micrometers per second)

Available water capacity total inches: 10.7 (very high)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: rare

Runoff class: low

Hydrologic group: B

Ecological site name: Prosopis glandulosa var. torreyana-Prosopis velutina/
Sporobolus wrightii

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F041XB221AZ

Present vegetation: mesquite, alkali sacaton, annual grasses

Land capability (irrigated): 2w

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 2,250 feet south and 2,150 feet east of northwest corner of Section 2, Township 5 S, Range 22 E

Soil Survey of San Carlos Indian Reservation, Arizona

Geographic Coordinate System:

33° 1' 44.70" north, 110° 3' 39.33" west

AC—0 to 2 inches (0 to 5 cm); light yellowish brown (10YR 6/4) fine sandy loam, brown (10YR 4/3), moist; 14 percent clay; moderate medium platy parting to moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine pores; 3 percent gravel; strongly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

C—2 to 13 inches (5 to 33 cm); light yellowish brown (10YR 6/4) silt loam, dark yellowish brown (10YR 4/4), moist; 23 percent clay; massive; soft, very friable, moderately sticky and moderately plastic; many very fine and fine roots; many very fine and fine pores; 10 percent gravel; violently effervescent; moderately alkaline, pH 8.2; gradual wavy boundary.

Ck—13 to 60 inches (33 to 152 cm); light yellowish brown (10YR 6/4) silt loam, dark yellowish brown (10YR 4/4), moist; 23 percent clay; massive; slightly hard, friable, moderately sticky and moderately plastic; common very fine, fine, and medium roots; many very fine and fine pores; prominent carbonate coats on rock fragments; 3 percent gravel; violently effervescent; strongly alkaline, pH 8.6.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 20 to 30 percent

Rock fragments: 0 to 5 percent

Gypsum: 0 to 2 percent

Calcium carbonate equivalent: 10 to 20 percent

Effervescence: strong to violent

Reaction (pH): moderately alkaline to strongly alkaline (7.9 to 9.0)

AC or Ap horizons

Hue: 7.5YR, 10YR

Value: 4 to 6, dry or moist

Chroma: 3 to 4 dry, 2 to 3 moist

Texture: sandy loam, fine sandy loam, silt loam, silty clay loam

Organic matter: 0.5 to 1.0 percent

Rock fragments: 0 to 5 percent

Electrical conductivity: 0.9 to 1.9 dS/m

Sodium Adsorption Ratio: 0.16 to 0.31

C horizons

Hue: 7.5YR, 10YR

Value: 4 to 6, dry or moist

Chroma: 2 to 4, dry or moist

Texture: silt loam, silty clay loam with strata of coarser or finer textures

Rock fragments: 0 to 5 percent

Electrical conductivity: 1.0 to 3.56 dS/m

Sodium Adsorption Ratio: 0.24 to 1.87

Gila soils

Taxonomic classification: Coarse-loamy, mixed, superactive, calcareous, thermic

Typic Torrifluvents

Geomorphic position: generally occurs on high benches along large drainageways

Parent material: mixed coarse-loamy alluvium

Slope: 0 to 3 percent

Surface cover:

Biological crust

Soil Survey of San Carlos Indian Reservation, Arizona

cyanobacteria: 5 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover: 30 percent
woody debris: 0 percent
bare soil: 55 percent
rock fragments
gravel: 15 percent
Drainage class: well drained
Ksat solum: 0.57 to 5.95 inches per hour (4.00 to 42.00 micrometers per second)
Available water capacity total inches: 10.3 (very high)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: rare
Runoff class: low
Hydrologic group: B
Ecological site name: Prosopis glandulosa var. torreyana-Prosopis velutina/
Sporobolus wrightii
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.
Ecological site number: F041XB221AZ
Present vegetation: mesquite, alkali sacaton, annual grasses
Land capability (irrigated): 2w
Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 300 feet north and 3,850 feet east of southwest corner of Section 35, Township 4 S, Range 22 E

Geographic Coordinate System:

33° 2' 8.30" north, 110° 3' 24.10" west

AC—0 to 1 inch (0 to 3 cm); pale brown (10YR 6/3) loam, brown (10YR 4/3), moist; 24 percent clay; weak fine granular structure; soft, very friable, moderately sticky and moderately plastic; many very fine and fine roots; many very fine and fine pores; 3 percent gravel; strongly effervescent; moderately alkaline, pH 8.4; clear smooth boundary.

C1—1 to 11 inches (3 to 28 cm); brown (7.5YR 5/4) silt loam, brown (7.5YR 4/3), moist; 20 percent clay; massive; soft, very friable, moderately sticky and moderately plastic; common very fine and fine roots; many very fine and fine pores; 3 percent gravel; strongly effervescent; strongly alkaline, pH 8.6; clear wavy boundary.

C2—11 to 25 inches (28 to 64 cm); brown (7.5YR 5/4) stratified very fine sandy loam, brown (7.5YR 4/3), moist; 17 percent clay; massive; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine pores; 3 percent gravel; strongly effervescent; strongly alkaline, pH 8.8; clear wavy boundary.

C3—25 to 60 inches (64 to 152 cm); brown (7.5YR 5/4) stratified silt loam, brown

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(7.5YR 4/3), moist; 17 percent clay; massive; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine pores; 3 percent gravel; strongly effervescent; strongly alkaline, pH 8.6.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 18 percent

Rock fragments: 0 to 5 percent

Gypsum: 0 to 2 percent

Calcium carbonate equivalent: 10 to 20 percent

Effervescence: strong to violent

Reaction (pH): moderately to strongly alkaline (7.9 to 9.0)

AC or Ap horizons

Hue: 7.5YR, 10YR

Value: 5 to 6 dry, 4 to 5 moist

Chroma: 3 to 4 dry, 2 to 3 moist

Texture: loam, sandy loam, fine sandy loam, silt loam, silty clay loam

Organic matter: 0.5 to 1.0 percent

Rock fragments: 0 to 5 percent

Electrical conductivity: 0.56 to 1.9 dS/m

Sodium Adsorption Ratio: 0.56 to 0.7

C horizons

Hue: 7.5YR, 10YR

Value: 5 to 6 dry, 4 to 5 moist

Chroma: 2 to 4, dry or moist

Texture: very fine sandy loam, fine sandy loam, sandy loam, silt loam with strata of coarser or finer textures

Rock fragments: 0 to 5 percent

Electrical conductivity: 0.14 to 1.4 dS/m

Sodium Adsorption Ratio: 0.5 to 1.13

37—Glendale-Gila complex, saline-sodic, 0 to 3 percent slopes

Map Unit Setting

Landform(s): flood plains

Elevation: 2,500 to 3,600 feet (762 to 1,097 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 60 to 67 degrees F (15.6 to 19.4 degrees C)

Mean annual soil temperature: 62 to 69 degrees F (16.7 to 20.5 degrees C)

Frost-free period: 190 to 250 days

Major Land Resource Area: 41-Southeastern Arizona Basin and Range

Land Resource Unit: 41-2 Chihuahuan-Sonoran Desert Shrub Mix

Map Unit Composition

Glendale, saline-sodic and similar soils: 50 percent

Gila, saline-sodic and similar soils: 40 percent

Minor components: Agustin, Anthony, and Torrifluvents soils occur at borders of the flood plain away from the stream channel. Vertic Torrifluvents soils occur on similar areas near San Carlos Reservoir.

Soil Properties and Qualities

Glendale, saline-sodic soils

Taxonomic classification: Fine-silty, mixed, superactive, calcareous, thermic Typic Torrifluvents

Geomorphic position: generally occurs on high benches along large drainageways

Parent material: mixed fine-silty alluvium

Slope: 0 to 3 percent

Surface cover:

Biological crust

 cyanobacteria: 5 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 5 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 70 percent

 woody debris: 0 percent

 bare soil: 30 percent

 Rock fragments: 0 percent

Drainage class: well drained

Ksat solum: 0.20 to 1.98 inches per hour (1.40 to 14.00 micrometers per second)

Available water capacity total inches: 8.4 (high)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: occasional

Runoff class: low

Hydrologic group: C

Ecological site name: Prosopis glandulosa var. torreyana-prosopis velutina/Suaeda moquini-atrilex canescens/Sporobolus airoides

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F041XB222AZ

Present vegetation: mesquite, alkali sacaton, desert saltbush, annual grasses, desert saltgrass, fourwing saltbush, seepweed

Land capability (irrigated): 3w

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 900 feet north and 1,850 feet west of southeast corner of Section 9, Township 3 S, Range 21 E

Geographic Coordinate System:

33° 10' 54.29" north, 110° 11' 46.64" west

A—0 to 1 inch (0 to 3 cm); pale brown (10YR 6/3) silty clay loam, dark brown (10YR 3/3), moist; 30 percent clay; moderate thick platy structure; soft, very friable, moderately sticky and moderately plastic; many very fine and fine roots; many very fine and fine pores; slightly effervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

Cnz1—1 to 14 inches (3 to 36 cm); brown (10YR 5/3) silty clay loam, brown (10YR 4/3), moist; 30 percent clay; moderate medium platy structure; slightly hard, very friable, moderately sticky and moderately plastic; many very fine and fine roots;

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common very fine and fine pores; strongly effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

Cnz2—14 to 32 inches (36 to 81 cm); brown (7.5YR 5/3) silt loam, brown (7.5YR 4/3), moist; 24 percent clay; moderate medium platy structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine and few medium roots; many very fine and fine pores; slightly effervescent; slightly alkaline, pH 7.6; abrupt wavy boundary.

Cnz3—32 to 60 inches (81 to 152 cm); brown (7.5YR 5/3) silty clay loam, brown (7.5YR 4/3), moist; 35 percent clay; moderate medium platy structure; soft, very friable, moderately sticky and moderately plastic; few fine and medium roots; many very fine and fine pores; strongly effervescent; moderately alkaline, pH 8.4.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 18 to 35 percent

Rock fragments: 0 to 5 percent

Gypsum: 0 to 2 percent

Calcium carbonate equivalent: 1 to 15 percent

Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 9.0)

AC or Ap horizons

Hue: 7.5YR, 10YR

Value: 5 to 6 dry, 3 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: loam, silt loam, silty clay loam, clay

Organic matter: 0.5 to 1.0 percent

Rock fragments: 0 to 5 percent

Electrical conductivity: 0 to 4 dS/m

Sodium Adsorption Ratio: 1 to 20

Effervescence: slight to strong

C horizons

Hue: 7.5YR, 10YR

Value: 4 to 6 dry, 4 moist

Chroma: 2 to 3, dry or moist

Texture: silty clay loam, silt loam, loam with strata of coarser or finer textures

Rock fragments: 0 to 5 percent

Electrical conductivity: 1 to 50 dS/m

Sodium Adsorption Ratio: 6 to 75

Effervescence: strong to violent

Gila, saline-sodic soils

Taxonomic classification: Coarse-loamy, mixed, superactive, calcareous, thermic

Typic Torrifluvents

Geomorphic position: generally occurs on high benches along large drainageways

Parent material: mixed coarse-loamy alluvium

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

Soil Survey of San Carlos Indian Reservation, Arizona

salt: 5 percent
gypsum: 0 percent
Physical cover
canopy plant cover: 60 percent
woody debris: 0 percent
bare soil: 40 percent
rock fragments
gravel: 1 percent
Drainage class: well drained
Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)
Available water capacity total inches: 5.9 (moderate)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: occasional
Runoff class: low
Hydrologic group: B
Ecological site name: Prosopis glandulosa var. torreyana-prosopis velutina/Suaeda
moquini-atrilex canescens/Sporobolus airoides
Other ecological sites may occur in this map unit and vary in extent between
delineations. Additional detailed site inventory is required for effective range and
forest management.
Ecological site number: F041XB222AZ
Present vegetation: mesquite, alkali sacaton, desert saltbush, annual grasses, desert
saltgrass, fourwing saltbush, seepweed
Land capability (irrigated): 3w
Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 1,500 feet north and 400 feet east of southwest corner of
Section 18, Township 3 S, Range 22 E

Geographic Coordinate System:

33° 10' 4.70" north, 110° 8' 11.30" west

Ap—0 to 6 inches (0 to 15 cm); grayish brown (10YR 5/2) very fine sandy loam, very
dark grayish brown (10YR 3/2), moist; 17 percent clay; weak medium and coarse
subangular blocky structure; slightly hard, very friable, slightly sticky and slightly
plastic; many very fine and fine and common medium roots; common very fine
and fine pores; strongly effervescent; strongly alkaline, pH 8.8; gradual wavy
boundary.

Cnz1—6 to 15 inches (15 to 38 cm); grayish brown (10YR 5/2) very fine sandy loam,
very dark grayish brown (10YR 3/2), moist; 9 percent clay; massive; slightly hard,
very friable, nonsticky and nonplastic; many very fine and fine and common medium
roots; common very fine and fine pores; strongly effervescent; strongly alkaline, pH
8.8; clear wavy boundary.

Cnz2—15 to 41 inches (38 to 104 cm); brown (7.5YR 4/3) loam, dark brown (7.5YR
3/2), moist; 20 percent clay; massive; slightly hard, very friable, slightly sticky and
slightly plastic; common very fine and fine roots; common very fine pores; strongly
effervescent; strongly alkaline, pH 8.8; abrupt wavy boundary.

Cnz3—41 to 58 inches (104 to 147 cm); brown (7.5YR 5/2) fine sandy loam, dark
brown (7.5YR 3/2), moist; 9 percent clay; massive; slightly hard, very friable,
nonsticky and nonplastic; common very fine and fine roots; common very fine pores;
slightly effervescent; strongly alkaline, pH 8.8; abrupt wavy boundary.

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Cnz4—58 to 60 inches (147 to 152 cm); brown (7.5YR 5/2) clay loam, dark brown (7.5YR 3/2), moist; 31 percent clay; massive; slightly hard, very friable, moderately sticky and moderately plastic; common very fine and fine roots; common very fine pores; slightly effervescent; strongly alkaline, pH 8.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 10 to 18 percent

Rock fragments: 0 to 3 percent

Calcium carbonate equivalent: 1 to 10 percent

Gypsum: 0 to 2 percent

Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 9.0)

AC or Ap horizons

Hue: 7.5YR, 10YR

Value: 4 or 6 dry, 3 or 4 moist

Chroma: 2 or 3, dry or moist

Texture: loam, silt loam, sandy loam, very fine sandy loam

Organic matter: 0.5 to 1.0 percent

Rock fragments: 0 to 5 percent

Electrical conductivity: 1 to 4 dS/m

Sodium Adsorption Ratio: 10 to 25

Effervescence: slight to strong

C horizons

Hue: 7.5YR, 10YR

Value: 4 or 5 dry, 3 to 5 moist

Chroma: 2 or 3, dry or moist

Texture: clay loam, silt loam, loam, sandy loam with strata of coarser or finer textures

Rock fragments: 0 to 5 percent

Electrical conductivity: 4 to 16 dS/m

Sodium Adsorption Ratio: 13 to 20

Effervescence: strong to violent

38—Goldust-Rock outcrop complex, 2 to 15 percent slopes

Map Unit Setting

Landform(s): plateaus

Elevation: 5,000 to 6,500 feet (1,524 to 1,981 meters)

Mean annual precipitation: 14 to 18 inches (356 to 457 millimeters)

Mean annual air temperature: 45 to 57 degrees F (7.2 to 13.9 degrees C)

Mean annual soil temperature: 47 to 59 degrees F (8.3 to 15.0 degrees C)

Frost-free period: 120 to 180 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-3 Interior Chaparral-Forests

Map Unit Composition

Goldust and similar soils: 70 percent

Rock outcrop: 15 percent

Minor components: Showlow soils occur in small areas throughout the unit. Soils that

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are shallow to sandstone, quartzite and/or limestone occur adjacent to Rock outcrop.

Soil Properties and Qualities

Goldust soils

Taxonomic classification: Clayey-skeletal, smectitic, mesic Aridic Paleustolls

Geomorphic position: generally occurs on summits

Parent material: clayey alluvium and/or colluvium derived from metamorphic and sedimentary rock

Slope: 2 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

tree canopy: 35 percent

plant cover: 70 percent

organic litter: 0 percent

woody debris: 0 percent

bare soil: 15 percent

rock fragments

gravel: 10 percent

cobble: 30 percent

stone: 20 percent

boulder: 2 percent

Drainage class: well drained

Ksat solum: 0.01 to 1.98 inches per hour (0.10 to 14.00 micrometers per second)

Available water capacity total inches: 4.9 (low)

Shrink-swell potential: about 10.5 LEP (very high)

Flooding hazard: none

Runoff class: high

Hydrologic group: D

Ecological site name: Loamy Upland 20-24" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XC307AZ

Present vegetation: alligator juniper, blue grama, curly mesquite, sideoats grama, gray oak, singleleaf pinyon, perennial forbs, Emory oak, agave, pricklypear

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,400 feet south and 1,200 feet east of the northwest corner of Section 6, Township 4N, Range 18E

Geographic Coordinate System:

33° 43' 7.70" north, 110° 30' 40.50" west

A—0 to 4 inches (0 to 10 cm); brown (7.5YR 4/3) extremely stony loam, dark brown (7.5YR 3/3), moist; 24 percent clay; moderate medium subangular blocky structure;

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slightly hard, friable, slightly sticky and nonplastic; common very fine and fine roots; many fine pores; 10 percent gravel and 30 percent cobble and 20 percent stone and 2 percent boulder; noneffervescent; neutral, pH 6.6; clear smooth boundary.

Bt1—4 to 18 inches (10 to 46 cm); brown (7.5YR 4/3) extremely stony clay loam, dark brown (7.5YR 3/3), moist; 32 percent clay; strong medium and coarse subangular blocky structure; very hard, very firm, moderately sticky and moderately plastic; common very fine and fine roots; common fine pores; few distinct pressure faces; common distinct clay films on faces of peds and rock fragments; 10 percent gravel and 30 percent cobble and 30 percent stone and 2 percent boulder; noneffervescent; slightly acid, pH 6.5; clear smooth boundary.

Bt2—18 to 35 inches (46 to 89 cm); brown (7.5YR 5/4) cobbly clay, brown (7.5YR 4/4), moist; 55 percent clay; strong medium and coarse angular blocky structure; rigid, very firm, very sticky and very plastic; few fine and medium roots; common fine pores; few distinct pressure faces; common distinct clay films on faces of peds and rock fragments; 10 percent gravel and 10 percent cobble and 5 percent stone; noneffervescent; slightly alkaline, pH 7.4; gradual wavy boundary.

Btss—35 to 60 inches (89 to 152 cm); strong brown (7.5YR 5/6) very cobbly clay, strong brown (7.5YR 4/6), moist; 50 percent clay; moderate medium and coarse angular blocky structure; extremely hard, firm, very sticky and very plastic; few fine roots; common fine pores; few distinct slickensides; few distinct clay films on faces of peds; few fine carbonate nodules; 10 percent gravel and 25 percent cobble and 5 percent stone; noneffervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 60 percent

Rock fragments: 35 to 60 percent

A horizons

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: loam or clay loam

Rock fragments: 20 to 70 percent

Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

Upper Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: clay loam, clay

Rock fragments: 35 to 80 percent

Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

Lower Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 4 to 6, dry or moist

Texture: clay loam, clay

Rock fragments: 35 to 80 percent

Effervescence: none to slight

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

Goldust as used in this mapping unit is a taxadjunct to the series because it meets the requirements for the Paleustolls great group by not decreasing in clay content by more than 20 percent and has high chroma to a depth of 60 inches. It also has smectitic mineralogy. Goldust series is a Clayey-skeletal, mixed, superactive, mesic Aridic Argiustolls.

Rock outcrop

Slope: 2 to 15 percent

Range in Characteristics

Rock outcrop consists of barren rock that occurs throughout the unit as ledges and outcroppings of quartzite, sandstone, and some limestone. It also includes areas where the depth to bedrock is less than four inches.

39—Goldust-Rock outcrop complex, 15 to 50 percent slopes

Map Unit Setting

Landform(s): plateaus

Elevation: 5,000 to 6,500 feet (1,524 to 1,981 meters)

Mean annual precipitation: 14 to 18 inches (356 to 457 millimeters)

Mean annual air temperature: 45 to 57 degrees F (7.2 to 13.9 degrees C)

Mean annual soil temperature: 47 to 59 degrees F (8.3 to 15.0 degrees C)

Frost-free period: 120 to 180 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-3 Interior Chaparral-Forests

Map Unit Composition

Goldust and similar soils: 60 percent

Rock outcrop: 20 percent

Minor components: Showlow soils occur in small areas throughout the unit. Soils that are shallow to sandstone, quartzite and/or limestone bedrock occur adjacent to areas of Rock outcrop.

Soil Properties and Qualities

Goldust soils

Taxonomic classification: Clayey-skeletal, smectitic, mesic Aridic Paleustolls

Geomorphic position: generally occurs on sloping escarpments

Parent material: clayey alluvium and/or colluvium derived from metamorphic and sedimentary rock

Slope: 15 to 50 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 tree canopy: 40 percent

 plant cover: 60 percent

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organic litter: 20 percent
woody debris: 5 percent
bare soil: 0 percent
rock fragments
 gravel: 40 percent
 cobble: 40 percent
 stone: 2 percent
 boulder: 1 percent

Drainage class: well drained

Ksat solum: 0.00 to 1.98 inches per hour (0.01 to 14.00 micrometers per second)

Available water capacity total inches: 4.3 (low)

Shrink-swell potential: about 10.5 LEP (very high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Loamy Slopes 20-24"

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XC316AZ

Present vegetation: alligator juniper, singleleaf pinyon, sideoats grama, hairy grama, gray oak, bullgrass, perennial forbs, Emory oak, turbinella oak, pointleaf manzanita, sacahuista

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,000 feet north and 1,850 feet east of the southwest corner of Section 32, Township 4.5N, Range 18E

Geographic Coordinate System:

33° 43' 47.30" north, 110° 29' 26.10" west

A—0 to 4 inches (0 to 10 cm); brown (7.5YR 5/2) extremely cobbly loam, dark brown (7.5YR 3/2), moist; 25 percent clay; weak thick platy parting to moderate fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine and common medium roots; many very fine and fine and common medium pores; 30 percent gravel and 30 percent cobble and 1 percent stone; noneffervescent; neutral, pH 7.0; clear smooth boundary.

Bt1—4 to 10 inches (10 to 25 cm); reddish brown (5YR 4/3) extremely cobbly clay loam, dark reddish brown (5YR 3/3), moist; 38 percent clay; strong fine and medium subangular blocky structure; hard, friable, moderately sticky and moderately plastic; common very fine and fine and common medium roots; common very fine and fine and common medium pores; few distinct clay films on faces of peds and rock fragments; 30 percent gravel and 30 percent cobble and 1 percent stone; noneffervescent; neutral, pH 6.6; gradual wavy boundary.

Bt2—10 to 30 inches (25 to 76 cm); yellowish red (5YR 4/6) gravelly clay, yellowish red (5YR 4/6), moist; 55 percent clay; moderate coarse prismatic and strong medium and coarse angular blocky structure; extremely hard, very firm, very sticky and very plastic; common very fine and fine and common medium and coarse roots; common very fine and fine and few medium pores; few distinct pressure faces; many prominent clay films on faces of peds and rock fragments; 25 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 6.6; gradual wavy boundary.

Bt3—30 to 50 inches (76 to 127 cm); yellowish red (5YR 4/6) very cobbly clay,

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yellowish red (5YR 4/6), moist; 50 percent clay; weak coarse prismatic and strong medium and coarse angular blocky structure; very hard, firm, very sticky and very plastic; common very fine and fine and common medium and coarse roots; common very fine and fine and few medium pores; few distinct pressure faces; common prominent clay films on faces of peds and rock fragments; 30 percent gravel and 20 percent cobble and 5 percent stone and 3 percent boulder; noneffervescent; neutral, pH 7.0; gradual wavy boundary.

Bt4—50 to 60 inches (127 to 152 cm); yellowish red (5YR 4/6) very cobbly clay, yellowish red (5YR 4/6), moist; 50 percent clay; weak coarse prismatic and strong medium and coarse angular blocky structure; very hard, firm, very sticky and very plastic; common very fine and fine and common medium and coarse roots; common very fine and fine and few medium pores; few distinct pressure faces; common prominent clay films on faces of peds and rock fragments; 20 percent gravel and 15 percent cobble and 5 percent stone and 3 percent boulder; noneffervescent; slightly alkaline, pH 7.4; gradual wavy boundary.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 60 percent

Rock fragments: 35 to 60 percent

A horizons

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: loam, clay loam

Rock fragments: 30 to 65 percent

Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

Upper Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: clay loam, clay

Rock fragments: 40 to 65 percent

Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

Lower Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 4 to 6, dry or moist

Texture: clay loam, clay

Rock fragments: 30 to 65 percent

Effervescence: none to slight

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

Goldust as used in this mapping unit is a taxadjunct to the series because it meets the requirements for the Paleustolls great group by not decreasing in clay content by more than 20 percent and has high chroma to a depth of 60 inches. It also has smectitic mineralogy. Goldust series is a Clayey-skeletal, mixed, superactive, mesic Aridic Argiustolls.

Rock outcrop

Slope: 15 to 50 percent

Range in Characteristics

Rock outcrop consists of barren rock that occurs throughout the unit as ledges and outcroppings of quartzite, sandstone and some limestone. It also includes areas where the depth to bedrock is less than four inches.

40—Granolite-Rock outcrop-Akela complex, 5 to 45 percent slopes

Map Unit Setting

Landform(s): hills

Elevation: 2,000 to 3,500 feet (610 to 1,067 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 64 to 70 degrees F (17.8 to 21.1 degrees C)

Mean annual soil temperature: 66 to 72 degrees F (18.9 to 22.2 degrees C)

Frost-free period: 220 to 280 days

Major Land Resource Area: 40-Sonoran Basin and Range

Land Resource Unit: 40-1 Upper Sonoran Desert Shrub

Map Unit Composition

Granolite and similar soils: 50 percent

Rock outcrop: 25 percent

Akela and similar soils: 15 percent

Minor components: Soils that have less than 35 percent rock fragments occur on similar positions as Granolite soils. Stagecoach soils occur on similar positions as Akela soils.

Soil Properties and Qualities

Granolite soils

Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic Lithic Haplargids

Geomorphic position: generally occurs on summits and back slopes

Parent material: slope alluvium and/or residuum weathered from andesite and/or volcanic rock

Slope: 5 to 45 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 5 percent

bare soil: 5 percent

rock fragments

gravel: 60 percent

cobble: 25 percent

Depth to restrictive feature(s): 8 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)

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Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 1.4 (very low)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Clayey Slopes 10-13" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R040XA103AZ

Present vegetation: pricklypear, jojoba, whitethorn, annual grasses, ocotillo, littleleaf paloverde, Englemann hedgehog cactus, catclaw acacia, false mesquite

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: Typical pedon description is from Soil Survey of Eastern Pinal and Southern Gila Counties, Arizona; about 1,000 feet north and 2,300 feet west of the southeast corner of Section 28, Township 7 S, Range 17 E

Geographic Coordinate System:

32° 47' 33.00" north, 110° 36' 40.00" west

A—0 to 1 inch (0 to 3 cm); dark reddish gray (5YR 4/2) very gravelly clay loam, dark reddish brown (5YR 3/3), moist; 30 percent clay; weak fine granular structure; soft, very friable, moderately sticky and moderately plastic; few fine roots; few fine pores; 30 percent gravel and 15 percent cobble; noneffervescent; slightly alkaline, pH 7.8; abrupt smooth boundary.

Bt1—1 to 11 inches (3 to 28 cm); dark reddish gray (5YR 4/2) very gravelly clay, reddish brown (5YR 4/3), moist; 55 percent clay; strong fine and medium angular blocky structure; hard, firm, very sticky and very plastic; many fine roots; few fine pores; common pressure faces; many continuous distinct clay films on faces of peds and rock fragments; 40 percent gravel; noneffervescent; slightly alkaline, pH 7.6; clear wavy boundary.

Bt2—11 to 17 inches (28 to 43 cm); dark reddish gray (5YR 4/2) very gravelly clay, reddish brown (5YR 4/3), moist; 47 percent clay; strong fine subangular blocky structure; hard, firm, moderately sticky and moderately plastic; few fine roots; few fine pores; common pressure faces; many continuous distinct clay films on faces of peds and rock fragments; 40 percent gravel and 10 percent cobble; noneffervescent; slightly alkaline, pH 7.6.

R—17 to 60 inches (43 to 152 cm); unweathered basalt and andesite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 60 percent

Rock fragments: 35 to 60 percent

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

A horizon

Hue: 7.5YR, 5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 4, dry or moist

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Texture: sandy loam, loam, clay loam
Effervescence: none

Bt horizons

Hue: 7.5YR, 5YR
Value: 3 to 4, dry or moist
Chroma: 2 to 4, dry or moist
Texture: sandy clay loam, clay loam, clay
Effervescence: none to slight

R horizons

Bedrock is hard basalt, andesite, and volcanic rock. Some pedons have thin weathered bedrock above the unweathered bedrock

Granolite as used in this mapping unit is a taxadjunct to the series because it has a lithic contact. Granolite series is Clayey-skeletal, mixed, superactive, thermic shallow Typic Haplargids.

Rock outcrop

Slope: 5 to 45 percent

Range in Characteristics

Rock outcrop consists of barren rock that occurs as ledges and outcroppings of basalt, andesite, and volcanic bedrocks. Rock outcrop also includes areas where the depth to bedrock is less than four inches. The higher percentage of rock outcrop is in areas near hill tops.

Akela soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, calcareous, thermic Lithic Torriorthents

Geomorphic position: generally occurs on summits and back slopes

Parent material: slope alluvium and/or residuum weathered from andesite and/or volcanic rock

Slope: 5 to 45 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent

Chemical crust

salt: 0 percent
gypsum: 0 percent

Physical cover

canopy plant cover: 25 percent
woody debris: 5 percent
bare soil: 5 percent
rock fragments
gravel: 60 percent
cobble: 20 percent

Depth to restrictive feature(s): 8 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 1.1 (very low)

Shrink-swell potential: about 1.5 LEP (low)

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Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Schist Hills 10-13" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R040XA119AZ

Present vegetation: pricklypear, jojoba, whitethorn, annual grasses, desert senna, catclaw acacia, ocotillo, fluffgrass, littleleaf paloverde, threeawn, Englemann hedgehog cactus, bush muhly, saguaro

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: Typical pedon description is from Soil Survey of Eastern Pinal and Southern Gila Counties, Arizona; about 1,000 feet north and 2,500 feet east of the southwest corner of Section 28, Township 7 S, Range 17 E

Geographic Coordinate System:

32° 47' 33.00" north, 110° 37' 5.00" west

A—0 to 1 inch (0 to 3 cm); brown (7.5YR 5/3) gravelly sandy loam, brown (7.5YR 4/3), moist; 10 percent clay; weak thin platy structure; soft, very friable, nonsticky and nonplastic; few fine roots; few fine pores; 20 percent gravel; slightly effervescent, 2 percent calcium carbonate equivalent; slightly alkaline, pH 7.8; clear smooth boundary.

Bk1—1 to 8 inches (3 to 20 cm); brown (7.5YR 5/4) very gravelly loam, dark brown (7.5YR 3/3), moist; 14 percent clay; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine and medium roots; common fine pores; many continuous distinct carbonate coats on rock fragments; 40 percent gravel and 5 percent cobble; strongly effervescent, 4 percent calcium carbonate equivalent; slightly alkaline, pH 7.8; abrupt smooth boundary.

Bk2—8 to 14 inches (20 to 36 cm); brown (7.5YR 5/3) very gravelly sandy loam, brown (7.5YR 4/4), moist; 10 percent clay; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; few fine pores; many continuous distinct carbonate coats on faces of peds and rock fragments; many fine and medium threadlike carbonate masses; 40 percent gravel; violently effervescent, 7 percent calcium carbonate equivalent; moderately alkaline, pH 8.0.

R—14 to 60 inches (36 to 152 cm); unweathered basalt and andesite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 20 percent

Rock fragments: 35 to 50 percent

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

A horizon

Hue: 10YR, 7.5YR

Value: 5 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

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Texture: sandy loam, loam
Rock fragments: 5 to 25 percent
Calcium carbonate equivalent: 1 to 5 percent

Bk horizons

Hue: 10YR, 7.5YR
Value: 5 dry, 3 to 4 moist
Chroma: 3 to 4, dry or moist
Texture: sandy loam, loam
Rock fragments: 35 to 50 percent
Calcium carbonate equivalent: 1 to 10 percent

R horizon

Bedrock is hard basalt, andesite, or volcanic rock

Some pedons have weak to strong calcium carbonate cementation.

41—Haplogypsids-Whitecliff-Badlands complex, 1 to 80 percent slopes

Map Unit Setting

Landform(s): alluvial fans, fan terraces
Elevation: 2,000 to 3,200 feet (610 to 975 meters)
Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)
Mean annual air temperature: 64 to 70 degrees F (17.8 to 21.1 degrees C)
Mean annual soil temperature: 66 to 72 degrees F (18.9 to 22.2 degrees C)
Frost-free period: 220 to 280 days
Major Land Resource Area: 40-Sonoran Basin and Range
Land Resource Unit: 40-1 Upper Sonoran Desert Shrub

Map Unit Composition

Haplogypsids and similar soils: 45 percent
Whitecliff and similar soils: 25 percent
Badlands: 20 percent
Minor components: Stagecoach soils and Haplogypsids soils that have greater than 9.0 pH, greater than 35 percent clay with vertic properties or less than 18 percent clay in the particle-size control section occur on similar positions as Whitecliff and Haplogypsids soils. Diatomite Rock outcrop occurs throughout map unit.

Soil Properties and Qualities

Haplogypsids soils

Taxonomic classification: Haplogypsids
Geomorphic position: generally occurs on summits and back slopes of fan terraces
Parent material: gypsiferous and calcareous lacustrine deposits and/or interbedded sedimentary rock
Slope: 5 to 80 percent
Surface cover:
Biological crust
cyanobacteria: 80 percent 0.24 inches thick crust
lichen: 0 percent
moss: 0 percent

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Chemical crust
salt: 0 percent
gypsum: 30 percent
Physical cover
canopy plant cover: 20 percent
woody debris: 5 percent
bare soil: 5 percent
Rock fragments: 0 percent
Depth to restrictive feature(s): 30 to 60 inches to bedrock, lithic; 45 to 60 inches to strongly contrasting textural stratification
Drainage class: well drained
Ksat solum: 0.06 to 5.95 inches per hour (0.42 to 42.00 micrometers per second)
Ksat restrictive layer: 0.20 to 0.57 inches per hour (1.40 to 4.00 micrometers per second)
Available water capacity total inches: 3.9 (low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: high
Hydrologic group: B
Ecological site name: Gypsum Upland 10-13" p.z.
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.
Ecological site number: R040XA126AZ
Present vegetation: creosotebush, Englemann hedgehog cactus, annual grasses, brittlebush, mesquite, pricklypear, giant sacaton, littleleaf paloverde, mormon tea, ocotillo
Land capability (non irrigated): 8

Typical Profile

Location

Public Land Survey: Typical pedon description is from Soil Survey of Eastern Pinal and Southern Gila Counties, Arizona; about 400 feet south and 1,100 feet east of the northwest corner of Section 28, Township 8 S, Range 17 E

Geographic Coordinate System:

32° 42' 50.00" north, 110° 37' 2.00" west

Bky1—0 to 8 inches (0 to 20 cm); white (10YR 8/1) gypsiferous sandy loam, light yellowish brown (10YR 6/4), moist; 5 percent clay; massive; soft, very friable, nonsticky and slightly plastic; common fine roots; many fine pores; common fine carbonate masses and many very fine gypsum crystals; strongly effervescent, 3 percent calcium carbonate equivalent and 30 percent gypsum; slightly alkaline, pH 7.8; abrupt smooth boundary.

Bky2—8 to 24 inches (20 to 61 cm); very pale brown (10YR 8/2) gypsiferous loam, brown (10YR 5/3), moist; 7 percent clay; massive; soft, very friable, nonsticky and slightly plastic; common fine and medium roots; many fine pores; common fine carbonate masses and many medium and coarse gypsum crystals; violently effervescent, 4 percent calcium carbonate equivalent and 30 percent gypsum; slightly alkaline, pH 7.6; abrupt smooth boundary.

Bky3—24 to 36 inches (61 to 91 cm); brown (7.5YR 5/3) gypsiferous clay, brown (7.5YR 4/3), moist; 42 percent clay; strong fine and medium platy structure; hard, firm, moderately sticky and very plastic; few medium roots; few fine pores; common fine carbonate masses and many fine and coarse gypsum crystals; violently

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effervescent, 5 percent calcium carbonate equivalent and 30 percent gypsum; moderately alkaline, pH 8.0; abrupt smooth boundary.

R—36 to 50 inches (91 to 127 cm); many very coarse gypsum crystals; unweathered consolidated gypsum bedrock; abrupt smooth boundary.

Cky—50 to 60 inches (127 to 152 cm); light brown (7.5YR 6/3) gypsiferous silt loam, strong brown (7.5YR 4/6), moist; 24 percent clay; moderate fine and medium subangular blocky structure; soft, very friable, moderately sticky and moderately plastic; common fine pores; common fine carbonate masses and common very fine gypsum crystals; violently effervescent, 4 percent calcium carbonate equivalent and 30 percent gypsum; moderately alkaline, pH 8.0.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 7 to 55 percent

Gypsum: 10 to 50 percent

Calcium carbonate equivalent: 1 to 25 percent

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

Bky and Cky horizons

Hue: 10YR, 2.5Y

Value: 5 to 8 dry, 4 to 7 moist

Chroma: 1 to 4 dry, 2 to 6 moist

Texture: loam, very fine sandy loam, silt loam, clay loam, silty clay loam, clay

Rock fragments: may contain up to 60 percent gypsum crystals and petrogypsic fragments

R horizon

Bedrock is consolidated calcareous and gypsiferous sedimentary rock interbedded with nonconsolidated (lacustrine sediments) materials. Can be cemented with gypsum, calcium carbonate, and/or silica. Bedrock is not present in all pedons within 60 inches.

Whitecliff soils

Taxonomic classification: Fine-silty, mixed, superactive, thermic Leptic Haplogypsis

Geomorphic position: generally occurs on alluvial fans between terraces and

Badlands

Parent material: gypsiferous and calcareous lacustrine deposits

Slope: 1 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 50 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 10 percent

Physical cover

canopy plant cover: 20 percent

woody debris: 5 percent

bare soil: 10 percent

rock fragments

gravel: 10 percent

Drainage class: well drained

Ksat solum: 0.57 to 5.95 inches per hour (4.00 to 42.00 micrometers per second)

Soil Survey of San Carlos Indian Reservation, Arizona

Available water capacity total inches: 8.3 (high)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: very rare

Runoff class: low

Hydrologic group: B

Ecological site name: Gypsum Upland 10-13" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R040XA126AZ

Present vegetation: creosotebush, giant sacaton, annual grasses, mesquite

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: Typical pedon description is from Soil Survey of Eastern Pinal and Southern Gila Counties, Arizona; about 900 feet south and 1,450 feet west of the northeast corner of Section 28, Township 8 S, Range 17 E

Geographic Coordinate System:

32° 42' 53.00" north, 110° 36' 58.00" west

A—0 to 1 inch (0 to 3 cm); pale brown (10YR 6/3) loam, dark yellowish brown (10YR 4/4), moist; 22 percent clay; moderate thick platy parting to moderate medium platy structure; soft, very friable, slightly sticky and moderately plastic; common fine pores; common fine gypsum masses and common fine gypsum crystals; strongly effervescent, 3 percent calcium carbonate equivalent and 8 percent gypsum; slightly alkaline, pH 7.8; abrupt smooth boundary.

Bky1—1 to 13 inches (3 to 33 cm); pale brown (10YR 6/3) gypsiferous loam, dark yellowish brown (10YR 4/4), moist; 20 percent clay; moderate fine and medium subangular blocky structure; soft, very friable, slightly sticky and moderately plastic; few medium roots; few fine pores; many fine gypsum crystals and many very fine and fine gypsum masses and many very fine and fine carbonate masses; violently effervescent, 4 percent calcium carbonate equivalent and 23 percent gypsum; slightly alkaline, pH 7.6; abrupt smooth boundary.

Bky2—13 to 18 inches (33 to 46 cm); pale brown (10YR 6/3) gypsiferous sandy loam, dark yellowish brown (10YR 4/4), moist; 10 percent clay; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots; common fine pores; many very fine gypsum crystals and many very fine gypsum masses and many very fine carbonate masses; violently effervescent, 6 percent calcium carbonate equivalent and 23 percent gypsum; slightly alkaline, pH 7.8; abrupt smooth boundary.

Bky3—18 to 60 inches (46 to 152 cm); pale brown (10YR 6/3) gypsiferous silt loam, dark yellowish brown (10YR 4/4), moist; 24 percent clay; moderate fine and medium subangular blocky structure; soft, very friable, slightly sticky and moderately plastic; few fine roots; few fine pores; common fine and medium gypsum crystals and many fine and medium gypsum masses and many very fine and fine carbonate masses; violently effervescent, 5 percent calcium carbonate equivalent and 23 percent gypsum; slightly alkaline, pH 7.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 18 to 27 percent

Rock fragments: 0 to 5 percent

Soil Survey of San Carlos Indian Reservation, Arizona

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

A horizon

Hue: 10YR
Value: 6 to 7 dry, 4 to 5 moist
Chroma: 2 to 3 dry, 3 to 4 moist
Texture: loam, silt loam, very fine sandy loam
Gypsum: 0 to 15 percent
Calcium carbonate equivalent: 1 to 5 percent

Bky horizons

Hue: 10YR
Value: 5 to 6 dry, 4 to 5 moist
Chroma: 3 to 4, dry or moist
Texture: loam, silt loam, sandy loam, thin strata for coarser textures
Gypsum: 5 to 40 percent
Calcium carbonate equivalent: 1 to 15 percent

Badlands

Slope: 40 to 80 percent

Range in Characteristics

A landscape which is intricately dissected and characterized by a very fine drainage network with high drainage densities and short, very steep and steep slopes that have narrow summits. Badlands consist of consolidated (calcareous and gypsiferous sedimentary bedrock) and non-consolidated (lacustrine sediments) materials with little or no vegetative cover.

42—Haplustalfs-Rock outcrop complex, 20 to 75 percent slopes

Map Unit Setting

Landform(s): hills, mountains
Elevation: 4,000 to 7,000 feet (1,219 to 2,134 meters)
Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)
Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)
Frost-free period: 160 to 210 days
Major Land Resource Area: 38-Mogollon Transition
Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Haplustalfs and similar soils: 55 percent
Haplustalfs, north aspect and similar soils: 30 percent
Rock outcrop: 10 percent
Minor components: Haplocambids, Ustorthents, Argiustolls, Budlamp and Woodcutter soils occur throughout the mapping unit.

Soil Properties and Qualities

Haplustalfs, south aspect soils

Taxonomic classification: Haplustalfs
Geomorphic position: generally occurs on south facing back slopes
Parent material: colluvium and/or residuum weathered from igneous rock

Soil Survey of San Carlos Indian Reservation, Arizona

Slope: 20 to 75 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 75 percent

 woody debris: 0 percent

 bare soil: 5 percent

 rock fragments

 fine gravel: 15 percent

 medium gravel: 20 percent

 coarse gravel: 25 percent

 cobble: 15 percent

Depth to restrictive feature(s): 6 to 12 inches to bedrock, paralithic; 7 to 17 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.20 to 0.57 inches per hour (1.40 to 4.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 0.6 (very low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Granitic Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB204AZ

Present vegetation: sideoats grama, bullgrass, hairy grama, sacahuista, singleleaf pinyon, turbinella oak, buckbrush, juniper, mountain mahogany, perennial forbs, perennial grasses, sotol

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,100 feet north and 400 feet west of southeast corner of Section 20, Township 4 S, Range 21 E

Geographic Coordinate System:

33° 4' 38.42" north, 110° 12' 53.38" west

A—0 to 2 inches (0 to 5 cm); brown (10YR 4/3) extremely gravelly sandy clay loam, dark brown (10YR 3/3), moist; 22 percent clay; moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine pores; 60 percent gravel and 15 percent cobble; noneffervescent; slightly acid, pH 6.4; clear wavy boundary.

Bt—2 to 7 inches (5 to 18 cm); brown (7.5YR 4/3) extremely gravelly sandy clay loam, brown (10YR 4/3), moist; 25 percent clay; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly

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plastic; many very fine and fine roots; many very fine and fine pores; many distinct clay films on faces of peds and rock fragments; 80 percent gravel; noneffervescent; neutral, pH 6.8; gradual wavy boundary.

Cr—7 to 12 inches (18 to 30 cm); weathered Tertiary igneous bedrock; clear wavy boundary.

R—12 to 60 inches (30 to 152 cm); Tertiary igneous bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 20 to 35 percent

Rock fragments: 10 to 80 percent

Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 2 to 4 moist

Chroma: 3 to 4 dry, 2 to 3 moist

Texture: sandy loam, sandy clay loam

Rock fragments: 30 to 80 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 to 5 moist

Chroma: 3 to 4, dry or moist

Texture: sandy clay, sandy clay loam, clay loam

Rock fragments: 10 to 80 percent

Cr and R horizons

Bedrock is soft to hard tertiary igneous rock

Haplustalfs, north aspect soils

Taxonomic classification: Haplustalfs

Geomorphic position: generally occurs on north facing back slopes

Parent material: colluvium and/or residuum weathered from igneous rock

Slope: 20 to 75 percent

Surface cover:

Biological crust

cyanobacteria: 3 percent

lichen: 0 percent

moss: 2 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 80 percent

woody debris: 5 percent

bare soil: 2 percent

rock fragments

fine gravel: 15 percent

medium gravel: 30 percent

coarse gravel: 25 percent

cobble: 5 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, paralithic; 5 to 25 inches to bedrock, lithic

Soil Survey of San Carlos Indian Reservation, Arizona

Drainage class: well drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 1.2 (very low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Pinus monophylla-Juniperus deppeana/Bouteloua curtipendula

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F038XB227AZ

Present vegetation: singleleaf pinyon, juniper, mountain mahogany, sacahuista, turbinella oak, agave, buckbrush, manzanita, perennial forbs, perennial grasses, sotol, sumac

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,600 feet north and 1,200 feet west of southeast corner of Section 20, Township 4 S, Range 21 E

Geographic Coordinate System:

33° 4' 13.70" north, 110° 12' 40.33" west

A—0 to 3 inches (0 to 8 cm); dark yellowish brown (10YR 4/4) very gravelly sandy loam, dark brown (10YR 3/3), moist; 12 percent clay; moderate medium and coarse granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine pores; 40 percent gravel; noneffervescent; slightly acid, pH 6.4; clear wavy boundary.

Bt—3 to 15 inches (8 to 38 cm); reddish brown (5YR 4/4) very gravelly sandy clay loam, reddish brown (5YR 4/3), moist; 25 percent clay; moderate fine and medium subangular blocky structure; slightly hard, friable, moderately sticky and slightly plastic; common very fine and fine and common medium and coarse roots; many very fine and fine pores; very many distinct clay films on faces of peds and rock fragments; 45 percent gravel; noneffervescent; slightly acid, pH 6.4; clear wavy boundary.

Cr—15 to 17 inches (38 to 43 cm); weathered Tertiary igneous bedrock; clear wavy boundary.

R—17 to 60 inches (43 to 152 cm); Tertiary igneous bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 20 to 45 percent

Rock fragments: 35 to 80 percent

Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: sandy loam, sandy clay loam
Rock fragments: 35 to 80 percent

Bt horizons

Hue: 5YR, 7.5YR
Value: 3 to 5 dry, 2 to 4 moist
Chroma: 3 to 5, dry or moist
Texture: sandy clay loam, clay
Rock fragments: 35 to 80 percent

Cr and R horizons

Bedrock is soft to hard tertiary igneous rock

Rock outcrop

Slope: 30 to 75 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops and ledges of mixed intrusive rocks. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

43—Hurds family-Rock outcrop-Brunopeak complex, 15 to 55 percent slopes

Map Unit Setting

Landform(s): hills, mountains
Elevation: 4,000 to 6,000 feet (1,219 to 1,829 meters)
Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)
Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)
Frost-free period: 160 to 210 days
Major Land Resource Area: 38-Mogollon Transition
Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Hurds family and similar soils: 45 percent
Rock outcrop: 25 percent
Brunopeak and similar soils: 15 percent
Minor components: Woodcutter and Beaumain soils occur on summits, shoulders, and back slopes.

Soil Properties and Qualities

Hurds family soils

Series and series family designations are naming expedients and equal.

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Aridic Argiustolls

Geomorphic position: generally occurs on summits and back slopes

Parent material: loamy-skeletal slope alluvium and/or colluvium and/or residuum weathered from quartzite

Slope: 20 to 55 percent

Surface cover:

Biological crust
cyanobacteria: 0 percent

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lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover: 65 percent
woody debris: 0 percent
bare soil: 5 percent
rock fragments
gravel: 25 percent
cobble: 55 percent
stone: 8 percent
boulder: 2 percent
Depth to restrictive feature(s): 25 to 50 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 3.0 (low)
Shrink-swell potential: about 4.5 LEP (moderate)
Flooding hazard: none
Runoff class: very high
Hydrologic group: C
Ecological site name: Clayey Hills 16-20" p.z.
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.
Ecological site number: R038XB215AZ
Present vegetation: hairy grama, gray oak, Emory oak, redberry juniper, Texas bluestem, cane beardgrass, plains lovegrass, singleleaf pinyon, Pringle manzanita, alligator juniper, bullgrass
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,000 feet south and 250 feet east of northwest corner of Section 3, Township 2 N, Range 19 E

Geographic Coordinate System:

33° 32' 57.20" north, 110° 21' 28.60" west

A1—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/3) extremely cobbly sandy loam, dark brown (7.5YR 3/3), moist; 15 percent clay; weak fine subangular blocky parting to weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine and common medium and coarse pores; 35 percent gravel and 40 percent cobble; noneffervescent; slightly acid, pH 6.4; clear wavy boundary.

A2—2 to 12 inches (5 to 30 cm); brown (7.5YR 4/2) very cobbly loam, dark brown (7.5YR 3/2), moist; 20 percent clay; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common very fine and fine and common medium and coarse roots; many very fine and fine and common medium and coarse pores; 20 percent gravel and 25 percent cobble; noneffervescent; neutral, pH 6.6; gradual wavy boundary.

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Bt1—12 to 30 inches (30 to 76 cm); reddish brown (5YR 5/4) extremely cobbly clay loam, reddish brown (5YR 4/4), moist; 33 percent clay; moderate medium and coarse subangular blocky structure; moderately hard, firm, slightly sticky and slightly plastic; common very fine and fine and common medium and coarse roots; common very fine and fine and common medium and coarse pores; few faint clay films on faces of peds and rock fragments; 30 percent gravel and 35 percent cobble and 1 percent stone; noneffervescent; neutral, pH 6.6; gradual wavy boundary.

Bt2—30 to 39.5 inches (76 to 100 cm); yellowish red (5YR 5/6) very cobbly clay loam, yellowish red (5YR 4/6), moist; 30 percent clay; moderate medium and coarse subangular blocky structure; moderately hard, firm, slightly sticky and slightly plastic; few very fine and fine and common medium and coarse roots; common very fine and fine and common medium and coarse pores; few faint clay bridges between sand grains; 25 percent gravel and 30 percent cobble and 1 percent stone; noneffervescent; neutral, pH 6.6; clear wavy boundary.

R—39.5 to 60 inches (100 to 152 cm); quartzite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 18 to 35 percent

Rock fragments: 35 to 70 percent

Effervescence: none

Reaction (pH): moderately acid to neutral (5.6 to 7.3)

A horizon

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 moist

Chroma: 2 to 3, dry or moist

Texture: loam, sandy loam, fine sandy loam

Rock fragments: 30 to 75 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 3 to 6, dry or moist

Texture: clay loam, loam, sandy clay loam, sandy loam

Rock fragments: 25 to 70 percent

BC or C horizons (where present) are similar to the Bt horizon, but include 10YR and have less clay content

R horizon

Bedrock is hard quartzite

Rock outcrop

Slope: 15 to 55 percent

Range in Characteristics

Rock outcrop consist of barren rock that occurs as ledges or nearly vertical cliffs of quartzite or other metamorphic rock. Rock outcrop also includes areas where the depth to bedrock is less than four inches.

Brunopeak soils

Taxonomic classification: Fine, mixed, superactive, thermic Aridic Paleustolls

Geomorphic position: generally occurs on foot slopes and lower back slopes

Parent material: clayey slope alluvium and/or colluvium derived from quartzite

Soil Survey of San Carlos Indian Reservation, Arizona

Slope: 15 to 45 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 70 percent

woody debris: 0 percent

bare soil: 5 percent

rock fragments

gravel: 40 percent

cobble: 40 percent

stone: 2 percent

Drainage class: well drained

Ksat solum: 0.00 to 5.95 inches per hour (0.01 to 42.00 micrometers per second)

Available water capacity total inches: 6.2 (moderate)

Shrink-swell potential: about 10.0 LEP (very high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Clayey Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB215AZ

Present vegetation: agave, Emory oak, bullgrass, curly mesquite, hairy grama, juniper, manzanita, mimosa, perennial forbs, pinyon, sacahuista, sideoats grama, sotol, sumac, turbinella oak, vine mesquite

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 200 feet north and 150 feet east of southwest corner of Section 34, Township 3 N, Range 19 E

Geographic Coordinate System:

33° 33' 12.80" north, 110° 21' 30.90" west

A1—0 to 4 inches (0 to 10 cm); dark reddish gray (5YR 4/2) very cobbly sandy loam, dark reddish brown (5YR 3/2), moist; 17 percent clay; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium and coarse roots; many very fine and fine and common medium and coarse pores; 25 percent gravel and 20 percent cobble; noneffervescent; neutral, pH 6.6; clear wavy boundary.

A2—4 to 16 inches (10 to 41 cm); reddish brown (5YR 4/3) very cobbly loam, dark reddish brown (5YR 3/3), moist; 25 percent clay; moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine and common medium and coarse roots; common very fine and fine and common medium and coarse pores; 30 percent gravel and 25 percent cobble; noneffervescent; slightly acid, pH 6.4; clear wavy boundary.

Bt1—16 to 46 inches (41 to 117 cm); red (2.5YR 5/6) gravelly clay, red (2.5YR 4/6), moist; 55 percent clay; strong medium and coarse angular blocky structure; very hard, very firm, very sticky and very plastic; few very fine and fine and common medium and coarse roots; common very fine and fine and common medium and coarse pores; few distinct pressure faces; few distinct clay films on faces of peds and rock fragments; 20 percent gravel and 10 percent cobble and 2 percent stone; noneffervescent; moderately acid, pH 6.0; gradual wavy boundary.

Bt2—46 to 60 inches (117 to 152 cm); reddish brown (5YR 5/4) gravelly clay, reddish brown (5YR 4/4), moist; 50 percent clay; 10 percent fine and medium distinct pale brown (10YR 6/3) mottles; strong medium and coarse angular blocky structure; very hard, very firm, very sticky and very plastic; few very fine and fine and common medium and coarse roots; common very fine and fine and common medium and coarse pores; few distinct pressure faces; few distinct clay films on faces of peds and rock fragments; 20 percent gravel and 10 percent cobble and 2 percent stone; noneffervescent; moderately acid, pH 5.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 55 percent

Rock fragments: 15 to 40 percent

Effervescence: none

Reaction (pH): moderately acid to neutral (5.6 to 7.3)

A horizon

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 moist

Chroma: 2 to 3, dry or moist

Texture: sandy loam, loam, clay loam

Rock fragments: 15 to 60 percent

Bt horizons

Hue: 2.5YR, 5YR, 7.5YR

Value: 3 to 5 dry, 2.5 to 5 moist

Chroma: 2 to 6, dry or moist

Texture: clay, clay loam, sandy clay loam

Rock fragments: 15 to 70 percent

Brunopeak as used in this mapping unit is a taxadjunct to the series because it has a fine instead of a clayey-skeletal particle-size control section. Brunopeak series is Clayey-skeletal, mixed, superactive, thermic Aridic Paleustolls.

44—Kuykendall-Beaumont-Rock outcrop complex, 5 to 45 percent slopes

Map Unit Setting

Landform(s): hills, mountains

Elevation: 4,200 to 6,200 feet (1,280 to 1,890 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Kuykendall and similar soils: 35 percent

Beaumain and similar soils: 30 percent

Rock outcrop: 15 percent

Minor components: Cloverdale and Cherrycow soils generally occur on slopes less than 15 percent. Ustorthents soils and soils that have less than 35 percent clay content in the particle-size control section generally occur on slopes greater than 20 percent or on andesite bedrock.

Soil Properties and Qualities

Kuykendall soils

Taxonomic classification: Clayey, smectitic, thermic Aridic Lithic Argiustolls

Geomorphic position: generally occurs on summits and back slopes

Parent material: residuum weathered from basalt and/or andesite

Slope: 5 to 45 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 50 percent

 woody debris: 5 percent

 bare soil: 5 percent

 rock fragments

 fine gravel: 20 percent

 medium gravel: 15 percent

 coarse gravel: 15 percent

 cobble: 25 percent

 stone: 5 percent

Depth to restrictive feature(s): 4 to 18 inches to bedrock, paralithic; 5 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.00 to 0.06 inches per hour (0.01 to 0.42 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 2.3 (very low)

Shrink-swell potential: about 10.0 LEP (very high)

Flooding hazard: none

Runoff class: high

Hydrologic group: D

Ecological site name: Clayey Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB215AZ

Present vegetation: sideoats grama, green sprangletop, plains lovegrass, shrubby

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buckwheat, cane beardgrass, juniper, muttongrass, perennial forbs, perennial grasses, prairie junegrass, sacahuista, turbinella oak

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,250 feet north and 2,450 feet west of southeast corner of Section 34, Township 1 S, Range 22 E

Geographic Coordinate System:

33° 17' 55.73" north, 110° 4' 39.34" west

A—0 to 2 inches (0 to 5 cm); dark reddish gray (5YR 4/2) very gravelly clay, dark reddish brown (5YR 3/3), moist; 48 percent clay; moderate fine and medium subangular blocky parting to weak fine granular structure; moderately hard, very friable, very sticky and very plastic; common very fine roots; many very fine pores; 25 percent gravel and 10 percent cobble and 5 percent stone; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt—2 to 16 inches (5 to 41 cm); dark reddish brown (5YR 3/3) clay, dark reddish brown (5YR 3/3), moist; 55 percent clay; strong medium and coarse angular blocky structure; extremely hard, very firm, very sticky and very plastic; many very fine and fine and common medium and very coarse roots; many very fine and fine pores; many prominent clay films on faces of peds and few distinct clay bridges between sand grains; 5 percent gravel; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

Cr—16 to 18 inches (41 to 46 cm); weathered andesite bedrock.

R—18 to 60 inches (46 to 152 cm); andesite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 40 to 60 percent

Rock fragments: 0 to 35 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

A horizon

Hue: 5YR, 7.5YR

Value: 3 to 4 dry, 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay, clay loam

Rock fragments: 10 to 40 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 4 dry, 2.5 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay

Rock fragments: 0 to 35 percent

R horizon

Bedrock is andesite or basalt

Beaumont soils

Taxonomic classification: Clayey-skeletal, smectitic, thermic Aridic Lithic Argiustolls

Soil Survey of San Carlos Indian Reservation, Arizona

Geomorphic position: generally occurs on back slopes in association with rock outcrop

Parent material: clayey skeletal alluvium and/or residuum weathered from andesite and/or basalt

Slope: 25 to 45 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 55 percent

woody debris: 5 percent

bare soil: 0 percent

rock fragments

gravel: 40 percent

cobble: 25 percent

stone: 15 percent

boulder: 2 percent

Depth to restrictive feature(s): 5 to 18 inches to bedrock, paralithic; 5 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.00 to 0.20 inches per hour (0.01 to 1.40 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 0.7 (very low)

Shrink-swell potential: about 10.0 LEP (very high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Clayey Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB215AZ

Present vegetation: sideoats grama, green sprangletop, plains lovegrass, shrubby buckwheat, cane beardgrass, juniper, muttongrass, perennial forbs, perennial grasses, prairie junegrass, sacahuista, turbinella oak

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,550 feet south and 425 feet west of the northeast corner of Section 34, Township 1 S, Range 22 E

Geographic Coordinate System:

33° 18' 9.54" north, 110° 4' 15.37" west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/3) very cobbly clay loam, dark brown (7.5YR 3/3), moist; 37 percent clay; moderate fine and medium subangular blocky structure; soft, loose, slightly sticky and nonplastic; many very fine and common fine roots; many very fine and few medium pores; 25 percent gravel and 20 percent

Soil Survey of San Carlos Indian Reservation, Arizona

cobble and 2 percent stone; noneffervescent; slightly alkaline, pH 7.7; abrupt wavy boundary.

Bt—2 to 8 inches (5 to 20 cm); dark brown (7.5YR 3/2) very cobbly clay, dark reddish brown (5YR 3/2), moist; 43 percent clay; weak fine and medium subangular blocky structure; moderately hard, very friable, very sticky and very plastic; many very fine and fine and few medium roots; many very fine and common medium pores; many distinct clay films on rock fragments and surfaces along root channels, and many distinct clay bridges between sand grains; 20 percent gravel and 25 percent cobble; noneffervescent; slightly alkaline, pH 7.5; clear irregular boundary.

Crt—8 to 10 inches (20 to 25 cm); few faint clay films along fractures of bedrock; weathered andesite bedrock.

R—10 to 60 inches (25 to 152 cm); andesite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 50 percent

Rock fragments: 35 to 75 percent

Effervescence: none

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 4 dry, 3 moist

Chroma: 2 to 3 dry, 1 to 3 moist

Texture: clay loam, loam

Rock fragments: 35 to 75 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 4, dry or moist

Chroma: 2 to 3 dry, 1 to 3 moist

Texture: clay, clay loam

Rock fragments: 35 to 75 percent

R horizon

Bedrock is andesite or basalt

Rock outcrop

Slope: 20 to 45 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops and ledges of Tertiary basalts and andesite. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

45—Kuykendall-Rock outcrop-Cloverdale complex, 1 to 25 percent slopes

Map Unit Setting

Landform(s): hills

Elevation: 4,200 to 6,000 feet (1,280 to 1,829 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Soil Survey of San Carlos Indian Reservation, Arizona

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Kuykendall and similar soils: 45 percent

Rock outcrop: 20 percent

Cloverdale and similar soils: 15 percent

Minor components: Beaumain, Brewster, and Magoffin soils occur on back slopes.

Cherrycow and Terrarossa soils occur on foot slopes. Ashcreek, Stanford, and

Rafter soils occur along drainageways.

Soil Properties and Qualities

Kuykendall soils

Taxonomic classification: Clayey, smectitic, thermic Aridic Lithic Argiustolls

Geomorphic position: generally occurs on summits and back slopes

Parent material: alluvium and/or residuum weathered from igneous rock

Slope: 1 to 25 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 75 percent

woody debris: 0 percent

bare soil: 10 percent

rock fragments

fine gravel: 10 percent

medium gravel: 15 percent

coarse gravel: 10 percent

cobble: 10 percent

Depth to restrictive feature(s): 4 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)

Ksat restrictive layer: 0.01 to 19.98 inches per hour (0.07 to 141.00 micrometers per second)

Available water capacity total inches: 1.8 (very low)

Shrink-swell potential: about 10.0 LEP (very high)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Volcanic Upland 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB213AZ

Present vegetation: blue grama, sideoats grama, shrubby buckwheat, tobosa, annual

Soil Survey of San Carlos Indian Reservation, Arizona

grasses, bottlebrush squirreltail, curly mesquite, hairy grama, perennial forbs,
prairie junegrass, sacahuista
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 650 feet south and 1,050 feet west of northeast corner of
Section 23, Township 1 S, Range 22 E

Geographic Coordinate System:

33° 20' 12.50" north, 110° 3' 20.00" west

A—0 to 1 inch (0 to 3 cm); brown (7.5YR 4/2) gravelly clay loam, dark brown (7.5YR 3/2), moist; 32 percent clay; moderate fine and medium subangular blocky parting to moderate fine and medium granular structure; slightly hard, very friable, very sticky and very plastic; many very fine roots; many very fine pores; 15 percent gravel; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

Bt1—1 to 8 inches (3 to 20 cm); brown (7.5YR 4/3) cobbly clay, dark brown (7.5YR 3/3), moist; 42 percent clay; strong medium and coarse subangular blocky structure; hard, very friable, very sticky and very plastic; many very fine and fine roots between peds; many very fine pores; very many distinct clay films on faces of peds and rock fragments; 5 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt2—8 to 16 inches (20 to 41 cm); brown (7.5YR 4/3) stony clay, dark brown (7.5YR 3/3), moist; 62 percent clay; strong medium and coarse subangular blocky structure; hard, friable, very sticky and very plastic; common very fine roots between peds; many very fine pores; common prominent pressure faces; many prominent clay films on faces of peds and rock fragments; 5 percent gravel and 5 percent cobble and 5 percent stone; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

R—16 to 60 inches (41 to 152 cm); basalt bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 40 to 65 percent

Rock fragments: 2 to 35 percent

Effervescence: none

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 moist

Chroma: 2 to 3 dry, 2 moist

Texture: clay, clay loam, loam

Rock fragments: 5 to 40 percent

Reaction (pH): neutral (6.6 to 7.3)

Bt horizons

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay

Rock fragments: 2 to 30 percent

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

R horizon

Bedrock is basalt or andesite

Rock outcrop

Slope: 1 to 25 percent

Range in Characteristics

Rock outcrop consists of exposures of barren bedrock that occurs as low outcrops and ledges of Tertiary basalt. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft. The higher percentage of the rock outcrop is near topographic highs.

Cloverdale soils

Taxonomic classification: Fine, smectitic, thermic Torriertic Argiustolls

Geomorphic position: generally occurs on foot slopes and toe slopes

Parent material: clayey alluvium and/or residuum weathered from basalt

Slope: 1 to 8 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 10 percent

 woody debris: 0 percent

 bare soil: 50 percent

 rock fragments

 fine gravel: 15 percent

 medium gravel: 10 percent

 coarse gravel: 10 percent

 cobble: 5 percent

Drainage class: well drained

Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)

Available water capacity total inches: 6.7 (moderate)

Shrink-swell potential: about 10.0 LEP (very high)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Clayey Upland 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB202AZ

Present vegetation: tobosa, prairie junegrass, annual grasses, blue grama, bottlebrush squirreltail, curly mesquite, perennial forbs, vine mesquite

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,150 feet south and 325 feet west of northeast corner of Section 23, Township 1 S, Range 22 E

Geographic Coordinate System:

33° 20' 8.37" north, 110° 3' 12.19" west

Soil Survey of San Carlos Indian Reservation, Arizona

A—0 to 2 inches (0 to 5 cm); dark brown (7.5YR 3/3) gravelly clay loam, dark brown (7.5YR 3/2), moist; 35 percent clay; moderate fine and medium granular structure; soft, loose, very sticky and very plastic; common very fine roots; many very fine and fine pores; 30 percent gravel; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

Bt1—2 to 12 inches (5 to 30 cm); dark brown (7.5YR 3/3) gravelly clay, dark brown (7.5YR 3/2), moist; 42 percent clay; strong medium and coarse angular blocky structure; extremely hard, very firm, very sticky and very plastic; many very fine roots; common very fine pores; common distinct clay films on faces of peds and few distinct clay films on surfaces along root channels; 25 percent gravel; noneffervescent; neutral, pH 7.2; gradual wavy boundary.

Bt2—12 to 35 inches (30 to 89 cm); dark brown (7.5YR 3/3) gravelly clay, dark brown (7.5YR 3/2), moist; 45 percent clay; moderate medium angular blocky structure; extremely hard, extremely firm, very sticky and very plastic; common very fine roots; common very fine pores; few distinct pressure faces; common distinct clay films on faces of peds and few distinct clay films on surfaces along root channels; 15 percent gravel; noneffervescent; slightly alkaline, pH 7.4; clear wavy boundary.

Btss—35 to 60 inches (89 to 152 cm); reddish brown (5YR 4/4) gravelly clay, reddish brown (5YR 4/3), moist; 42 percent clay; weak medium angular blocky and weak medium wedge structure; very hard, extremely firm, very sticky and very plastic; common very fine roots; common very fine pores; few distinct slickensides; many distinct pressure faces; few distinct clay films on faces of peds; 15 percent fine prominent black (7.5YR 2.5/1), iron-manganese masses; 20 percent gravel; noneffervescent; neutral, pH 7.2.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 60 percent

Rock fragments: 5 to 20 percent

Cracks:

Width: 0.5 to 1 inch

Depth: surface to 30 inches

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay loam

Rock fragments: 5 to 40 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Bt horizons

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 3 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: clay, clay loam

Rock fragments: 5 to 35 percent

Effervescence: none

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

Btss horizon

Hue: 5YR, 7.5YR

Value: 4 to 5, dry or moist

Chroma: 3 to 4, dry or moist
Texture: clay, clay loam
Rock fragments: 10 to 35 percent
Effervescence: none to strong
Reaction (pH): neutral to strongly alkaline (6.6 to 9.0)

46—Kuykendall-Rock outcrop-Woodcutter complex, 3 to 50 percent slopes

Map Unit Setting

Landform(s): hills, mountains
Elevation: 4,200 to 6,000 feet (1,280 to 1,829 meters)
Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)
Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)
Frost-free period: 160 to 210 days
Major Land Resource Area: 38-Mogollon Transition
Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Kuykendall and similar soils: 35 percent
Rock outcrop: 30 percent
Woodcutter and similar soils: 25 percent
Minor components: Beaumain soils occur on similar positions as Kuykendall soils.
Cloverdale soils occur on foot slopes and toe slopes. Brewster soils occur on back slopes. Soils that are deep to bedrock and contain less than 35 percent rock fragments occur on similar positions as Woodcutter.

Soil Properties and Qualities

Kuykendall soils

Taxonomic classification: Clayey, smectitic, thermic Aridic Lithic Argiustolls
Geomorphic position: generally occurs on summits, foot slopes, and less sloping back slopes
Parent material: residuum and/or colluvium derived from andesite and/or rhyolite
Slope: 3 to 35 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent
moss: 5 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover: 60 percent
woody debris: 5 percent
bare soil: 5 percent
rock fragments
fine gravel: 10 percent
medium gravel: 15 percent
coarse gravel: 10 percent
cobble: 5 percent

Soil Survey of San Carlos Indian Reservation, Arizona

Depth to restrictive feature(s): 4 to 16 inches to bedrock, paralithic; 5 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.00 to 5.95 inches per hour (0.01 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 19.98 inches per hour (0.00 to 141.00 micrometers per second)

Available water capacity total inches: 0.7 (very low)

Shrink-swell potential: about 10.0 LEP (very high)

Flooding hazard: none

Runoff class: high

Hydrologic group: D

Ecological site name: Clayey Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB215AZ

Present vegetation: sideoats grama, green sprangletop, plains lovegrass, shrubby buckwheat, cane beardgrass, juniper, muttongrass, perennial forbs, perennial grasses, prairie junegrass, sacahuista, turbinella oak

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,800 feet north and 500 feet west of southeast corner of Section 24, Township 1 S, Range 22 E

Geographic Coordinate System:

33° 19' 42.63" north, 110° 2' 11.36" west

A—0 to 1 inch (0 to 3 cm); grayish brown (10YR 5/2) gravelly sandy loam, dark brown (10YR 3/3), moist; 10 percent clay; moderate medium platy parting to weak very fine and fine granular structure; soft, loose, nonsticky and nonplastic; many very fine roots; many very fine pores; 15 percent gravel; noneffervescent; neutral, pH 7.2; abrupt smooth boundary.

Bt—1 to 5 inches (3 to 13 cm); brown (7.5YR 4/3) clay, dark brown (10YR 3/3), moist; 45 percent clay; moderate fine and medium subangular blocky structure; moderately hard, friable, slightly sticky and slightly plastic; many very fine and common coarse roots; many very fine and fine pores; few prominent clay films on surfaces along root channels and many distinct clay bridges between sand grains; 5 percent gravel; noneffervescent; neutral, pH 7.2; abrupt irregular boundary.

Cr—5 to 6 inches (13 to 15 cm); weathered basalt bedrock.

R—6 to 60 inches (15 to 152 cm); basalt bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 45 percent

Rock fragments: 5 to 10 percent

Effervescence: none

Reaction (pH): neutral (6.6 to 7.3)

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2.5 to 3 moist

Chroma: 2 to 3, dry or moist

Soil Survey of San Carlos Indian Reservation, Arizona

Texture: sandy clay loam, sandy loam
Rock fragments: 10 to 25 percent

Bt horizons

Hue: 7.5YR, 10YR
Value: 3 to 4 dry, 2.5 to 3 moist
Chroma: 2 to 3, dry or moist
Texture: clay, clay loam
Rock fragments: 5 to 15 percent

R horizon

Bedrock is hard rhyolite, basalt, or andesite

Rock outcrop

Slope: 25 to 50 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops and ledges of Tertiary rhyolite. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

Woodcutter soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Aridic Lithic Argiustolls

Geomorphic position: generally occurs on summits and back slopes

Parent material: residuum and/or colluvium derived from andesite and/or rhyolite

Slope: 3 to 50 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
lichen: 3 percent
moss: 2 percent

Chemical crust

salt: 0 percent
gypsum: 0 percent

Physical cover

canopy plant cover: 55 percent
woody debris: 5 percent
bare soil: 0 percent
rock fragments
fine gravel: 10 percent
medium gravel: 5 percent
coarse gravel: 5 percent
cobble: 15 percent
stone: 15 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Ksat restrictive layer: 0.01 to 19.98 inches per hour (0.07 to 141.00 micrometers per second)

Available water capacity total inches: 1.0 (very low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: high

Soil Survey of San Carlos Indian Reservation, Arizona

Hydrologic group: D

Ecological site name: Clayey Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB215AZ

Present vegetation: sideoats grama, Emory oak, blue grama, hairy grama, prairie junegrass, shrubby buckwheat, Arizona white oak, false mesquite, juniper, perennial forbs, perennial grasses, purple grama, turbinella oak

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 600 feet south and 1,100 feet east of northwest corner of Section 30, Township 1 S, Range 23 E

Geographic Coordinate System:

33° 19' 17.52" north, 110° 1' 58.96" west

A—0 to 1.5 inches (0 to 4 cm); dark grayish brown (10YR 4/2) gravelly sandy loam, dark brown (7.5YR 3/2), moist; 8 percent clay; moderate fine granular parting to single grain structure; soft, loose, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 30 percent gravel and 4 percent stone; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt—1.5 to 10 inches (4 to 25 cm); dark grayish brown (10YR 4/2) very gravelly clay loam, dark brown (7.5YR 3/2), moist; 35 percent clay; moderate medium and coarse subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; common very fine and fine and common very coarse roots; many very fine pores; common distinct clay bridges between sand grains; 25 percent gravel and 15 percent cobble; noneffervescent; neutral, pH 7.2; abrupt irregular boundary.

R—10 to 60 inches (25 to 152 cm); rhyolitic bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 20 to 35 percent

Rock fragments: 35 to 55 percent

Effervescence: none

Reaction (pH): neutral (6.6 to 7.3)

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 2.5 to 3 moist

Chroma: 2 to 4 dry, 1 to 3 moist

Texture: sandy clay loam, sandy loam

Rock fragments: 20 to 40 percent

Bt horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 2.5 to 3 moist

Chroma: 2 to 4 dry, 2 to 3 moist

Texture: sandy clay loam, clay loam

Rock fragments: 20 to 60 percent

R horizon

Bedrock is hard rhyolite, basalt, or andesite

47—Limpia family-Beaumain-Rock outcrop complex, 10 to 50 percent slopes

Map Unit Setting

Landform(s): fan terraces, pediments

Elevation: 4,200 to 6,000 feet (1,280 to 1,829 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Limpia family and similar soils: 40 percent

Beaumain and similar soils: 38 percent

Rock outcrop: 15 percent

Minor components: Cloverdale soils occur on similar positions as Limpia family soils.

Cherrycow and Turist soils occur on similar positions as Beaumian soils.

Soil Properties and Qualities

Limpia family soils

Series and series family designations are naming expedients and equal.

Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic Pachic

Argiustolls

Geomorphic position: generally occur on fan terraces below steep mountain slopes

Parent material: clayey skeletal alluvium and/or colluvium derived from volcanic rock

Slope: 10 to 25 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 0 percent

bare soil: 25 percent

rock fragments

gravel: 25 percent

cobble: 15 percent

stone: 20 percent

boulder: 15 percent

Drainage class: well drained

Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)

Available water capacity total inches: 5.1 (moderate)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Soil Survey of San Carlos Indian Reservation, Arizona

Ecological site name: Clayey Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB215AZ

Present vegetation: sideoats grama, curly mesquite, perennial forbs, pricklypear, sacahuista, plains lovegrass, spidergrass, bottlebrush squirreltail, Hall's panic, green sprangletop, mimosa

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 615 feet south and 2,100 feet west of northeast corner of Section 20, Township 1 S, Range 24 E

Geographic Coordinate System:

33° 20' 11.84" north, 109° 54' 17.36" west

A—0 to 2 inches (0 to 5 cm); dark brown (7.5YR 3/2) very cobbly sandy clay loam, very dark brown (7.5YR 2.5/2), moist; 30 percent clay; moderate fine and medium subangular blocky parting to strong very fine and fine granular structure; slightly hard, very friable, moderately sticky and moderately plastic; many very fine and fine and few medium and coarse roots; many very fine and fine and few medium pores; 20 percent gravel and 20 percent cobble and 5 percent stone; noneffervescent; slightly alkaline, pH 7.4; clear smooth boundary.

Bt1—2 to 10 inches (5 to 25 cm); very dark grayish brown (10YR 3/2) very stony clay, very dark brown (10YR 2/2), moist; 42 percent clay; strong medium and coarse subangular blocky parting to moderate fine and medium granular structure; moderately hard, very friable, very sticky and very plastic; many very fine and fine and few medium and coarse roots; many very fine and fine pores; many distinct clay films on faces of peds and rock fragments; 20 percent gravel and 22 percent cobble and 15 percent stone; noneffervescent; neutral, pH 7.2; gradual wavy boundary.

Bt2—10 to 28 inches (25 to 71 cm); very dark grayish brown (10YR 3/2) very cobbly clay, very dark brown (10YR 2/2), moist; 60 percent clay; strong medium and coarse wedge and strong medium and coarse angular blocky structure; very hard, firm, very sticky and very plastic; common very fine and fine and few medium and coarse roots; few very fine and fine pores; many prominent clay films on faces of peds and rock fragments; common medium and coarse carbonate nodules; 20 percent gravel and 15 percent cobble and 5 percent stone; noneffervescent; slightly alkaline, pH 7.4; gradual wavy boundary.

Btk1—28 to 45 inches (71 to 114 cm); reddish brown (5YR 4/4) very cobbly clay, dark reddish brown (5YR 3/4), moist; 46 percent clay; moderate medium and coarse angular blocky and moderate fine and medium wedge structure; very hard, very firm, very sticky and very plastic; common very fine and fine and few medium and coarse roots; common very fine and fine pores; common distinct clay films on faces of peds and rock fragments; few carbonate coats on rock fragments; common medium and coarse carbonate masses and nodules; 30 percent gravel and 15 percent cobble and 10 percent stone; strongly effervescent; strongly alkaline, pH 8.6 by Thymol-blue; gradual wavy boundary.

Btk2—45 to 70 inches (114 to 178 cm); reddish brown (5YR 5/4) extremely cobbly clay loam, reddish brown (5YR 4/4), moist; 30 percent clay; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine and fine pores; common distinct clay films on faces of peds and rock fragments; common carbonate coats on rock

Soil Survey of San Carlos Indian Reservation, Arizona

fragments; 5 percent fine and medium iron-manganese nodules; common medium and coarse carbonate masses and nodules; 40 percent gravel and 15 percent cobble and 10 percent stone; violently effervescent; strongly alkaline, pH 8.6 by Thymol-blue.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 60 percent

Rock fragments: 35 to 60 percent

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 4 dry, 2.5 to 3 moist

Chroma: 2, dry or moist

Texture: sandy clay loam, clay loam, clay

Rock fragments: 30 to 60 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Bt horizons

Hue: 7.5YR, 10YR

Value: 2.5 to 3 dry, 2 to 2.5 moist

Chroma: 1 to 3, dry or moist

Texture: clay, clay loam

Rock fragments: 35 to 65 percent

Effervescence: none to violent

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

Btk horizon

Hue: 5YR, 7.5YR

Value: 3 to 4 dry or moist

Chroma: 3 to 4, dry or moist

Texture: clay, clay loam

Rock fragments: 35 to 70 percent

Effervescence: strong to violent

Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 9.0)

Beaumain soils

Taxonomic classification: Clayey-skeletal, smectitic, thermic Aridic Lithic

Argiustolls

Geomorphic position: generally occurs on back slopes of pediments below steep mountain slopes

Parent material: clayey skeletal alluvium and/or residuum weathered from andesite and/or basalt

Slope: 10 to 50 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 90 percent

woody debris: 0 percent

bare soil: 5 percent

Soil Survey of San Carlos Indian Reservation, Arizona

rock fragments
gravel: 50 percent
cobble: 20 percent
stone: 2 percent
boulder: 1 percent

Depth to restrictive feature(s): 4 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.00 to 1.98 inches per hour (0.01 to 14.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 0.6 (very low)

Shrink-swell potential: about 10.0 LEP (very high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Clayey Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB215AZ

Present vegetation: sideoats grama, blue grama, plains lovegrass, hairy grama, cane beardgrass, wolftail, sacahuista, Hall's panic, Texas bluestem, perennial forbs, netleaf hackberry, banana yucca, pricklypear

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 760 feet north and 500 feet west of southeast corner of Section 33, Township 1 S, Range 25 E

Geographic Coordinate System:

33° 17' 49.70" north, 109° 46' 46.20" west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/3) extremely gravelly loam, dark brown (7.5YR 3/2), moist; 22 percent clay; moderate medium subangular blocky parting to moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium roots; many very fine and fine pores; 50 percent gravel and 20 percent cobble and 2 percent stone and 1 percent boulder; noneffervescent; neutral, pH 6.6; abrupt smooth boundary.

Bt—2 to 12 inches (5 to 30 cm); dark reddish gray (5YR 4/2) extremely gravelly clay, dark reddish brown (5YR 2.5/2), moist; 45 percent clay; strong medium and coarse subangular blocky structure; very hard, friable, very sticky and very plastic; common very fine and fine and few medium roots; common very fine and fine and few medium pores; common distinct clay films on faces of peds and rock fragments; 20 percent gravel and 50 percent cobble; noneffervescent; neutral, pH 6.6; clear wavy boundary.

R—12 to 60 inches (30 to 152 cm); basalt bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 50 percent

Rock fragments: 35 to 75 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

A horizons

Hue: 7.5YR, 10YR
Value: 3 to 4 dry, 2 to 3 moist
Chroma: 2 to 3 dry, 1 to 3 moist
Texture: clay loam, loam
Rock fragments: 35 to 75 percent

Bt horizons

Hue: 5YR, 7.5YR
Value: 3 to 4 dry, 2 to 3 moist
Chroma: 2 to 3 dry, 1 to 3 moist
Texture: clay, clay loam
Rock fragments: 35 to 75 percent

R horizon

Bedrock is andesite or basalt

Rock outcrop

Slope: 10 to 50 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops and ledges of mostly Tertiary basalt and andesite. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

48—Lithic Haplustolls-Anezul-Rock outcrop complex, 1 to 40 percent slopes

Map Unit Setting

Landform(s): mountains
Elevation: 5,800 to 7,200 feet (1,768 to 2,195 meters)
Mean annual precipitation: 18 to 24 inches (457 to 610 millimeters)
Mean annual air temperature: 45 to 57 degrees F (7.2 to 13.9 degrees C)
Mean annual soil temperature: 47 to 59 degrees F (8.3 to 15.0 degrees C)
Frost-free period: 120 to 180 days
Major Land Resource Area: 38-Mogollon Transition
Land Resource Unit: 38-3 Interior Chaparral-Forests

Map Unit Composition

Lithic Haplustolls and similar soils: 43 percent
Rock outcrop: 17 percent
Minor components: Soils that are less than 20 inches to sandstone bedrock occur in small areas throughout mapping unit. Soils that are deep to bedrock occur along small drainageways.

Soil Properties and Qualities

Lithic Haplustolls soils

Taxonomic classification: Lithic Haplustolls
Geomorphic position: generally occurs on summits and back slopes
Parent material: loamy colluvium and/or residuum weathered from welded tuff and/or rhyolite
Slope: 1 to 40 percent

Soil Survey of San Carlos Indian Reservation, Arizona

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

tree canopy cover: 55 percent

plant cover: 30 percent

organic litter: 20

woody debris: 5 percent

bare soil: 15 percent

rock fragments

gravel: 30 percent

Depth to restrictive feature(s): 7 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 1.1 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: high

Hydrologic group: D

Ecological site name: Pinus ponderosa-Quercus grisea/Bouteloua curtipendula-Poa fendleriana

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F038XC315AZ

Present vegetation: ponderosa pine, gray oak, alligator juniper, bottlebrush squirreltail, bullgrass, muttongrass, perennial forbs

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,050 feet south and 1,900 feet west of northeast corner of Section 16, Township 1 S, Range 26 E

Geographic Coordinate System:

33° 21' 1.50" north, 109° 40' 48.90" west

Oe—0 to 1 inch (0 to 3 cm) moderately decomposed plant material; 1 percent clay; neutral, pH 6.6; abrupt smooth boundary.

A—1 to 3 inches (3 to 8 cm); dark grayish brown (10YR 4/2) gravelly loam, very dark brown (10YR 2/2), moist; 12 percent clay; weak fine subangular blocky parting to moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine pores; 25 percent gravel; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

Bw—3 to 10 inches (8 to 25 cm); dark brown (7.5YR 3/3) gravelly loam, very dark brown (7.5YR 2.5/2), moist; 16 percent clay; moderate fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine

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and fine and common medium and coarse roots; many very fine pores; few faint clay films on rock fragments; 15 percent gravel; noneffervescent; neutral, pH 7.2; very abrupt wavy boundary.

R—10 to 60 inches (25 to 152 cm); welded tuff bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 10 to 25 percent

Rock fragments: 5 to 35 percent

Effervescence: none

Reaction (pH): slightly acid to slightly alkaline (6.1 to 7.8)

O horizon (where present)

1 to 4 inch thick layer of slightly to moderately decomposed pine leaf litter

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: loam, sandy loam

Rock fragments: 5 to 35 percent

Bt horizons

Hue: 7.5YR, 10YR

Value: 3 to 4 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: loam, clay loam, sandy clay loam

Clay content: 10 to 35 percent

Rock fragments: 5 to 35 percent

R horizon

Bedrock is welded tuff or rhyolite

Anezul soils

Taxonomic classification: Clayey, smectitic, mesic Lithic Argiustolls

Geomorphic position: generally occurs on summits and back slopes

Parent material: clayey colluvium and/or residuum weathered from welded tuff and/or rhyolite

Slope: 1 to 40 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

tree canopy cover: 30 percent

plant cover: 38 percent

organic litter: 5

woody debris: 1 percent

bare soil: 14 percent

rock fragments

gravel: 20 percent

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cobble: 15 percent

stone: 5 percent

boulder: 2 percent

Depth to restrictive feature(s): 7 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 2.5 (very low)

Shrink-swell potential: about 10.5 LEP (very high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Clay Loam Upland 20-24" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XC303AZ

Present vegetation: blue grama, broom snakeweed, shrubby buckwheat, sideoats grama, spidergrass, threeawn, perennial forbs, hairy grama, spike muhly, western wheatgrass, alligator juniper

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,200 feet south and 1,580 feet east of northwest corner of Section 4, Township 1 S, Range 25 E

Geographic Coordinate System:

33° 22' 32.79" north, 109° 47' 22.69" west

A—0 to 4 inches (0 to 10 cm); very dark grayish brown (10YR 3/2) clay loam, very dark brown (10YR 2/2), moist; 28 percent clay; weak fine subangular blocky parting to moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine and few medium roots; many very fine and fine pores; 5 percent gravel and 2 percent cobble and 2 percent stone and 1 percent boulder; noneffervescent; slightly acid, pH 6.2; clear smooth boundary.

Bt1—4 to 10 inches (10 to 25 cm); very dark grayish brown (10YR 3/2) clay loam, very dark brown (10YR 2/2), moist; 36 percent clay; moderate medium and coarse subangular blocky parting to moderate medium granular structure; hard, friable, moderately sticky and moderately plastic; common very fine and fine and few medium and coarse roots; many very fine and fine pores; common faint clay films on faces of peds; 5 percent gravel and 2 percent cobble and 2 percent stone and 1 percent boulder; noneffervescent; slightly acid, pH 6.2; clear smooth boundary.

Bt2—10 to 15.5 inches (25 to 40 cm); brown (7.5YR 4/3) cobbly clay, dark brown (7.5YR 3/3), moist; 55 percent clay; strong medium angular blocky structure; very hard, firm, very sticky and very plastic; few very fine and fine and few medium and coarse roots; many very fine pores; few distinct pressure faces; common distinct clay films on faces of peds; 10 percent gravel and 5 percent cobble and 2 percent stone and 1 percent boulder; noneffervescent; slightly acid, pH 6.2; abrupt wavy boundary.

R—15.5 to 60 inches (40 to 152 cm); welded tuff bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 55 percent

Rock fragments: 5 to 35 percent

Effervescence: none

Reaction (pH): slightly acid to slightly alkaline (6.1 to 7.8)

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay loam, loam

Rock fragments: 5 to 30 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: clay, clay loam

Rock fragments: 5 to 35 percent

R horizon

Bedrock is welded tuff or rhyolite

Rock outcrop

Slope: 1 to 40 percent

Range in Characteristics

Rock outcrop consists of exposures of barren bedrock that occurs as low outcrops and ledges of Tertiary welded tuff and rhyolite. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft. The higher percentage of the rock outcrop is near topographic highs.

49—Mabray-Rock outcrop complex, 20 to 75 percent slopes

Map Unit Setting

Landform(s): hills, mountains (fig. 4)

Elevation: 3,000 to 5,000 feet (914 to 1,524 meters)

Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)

Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)

Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)

Frost-free period: 180 to 230 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-1 Lower Interior Chaparral

Map Unit Composition

Mabray and similar soils: 45 percent

Rock outcrop: 40 percent

Minor components: Tombstone soils occur on lower foot slopes and toe slopes.

Lampshire soils occur on areas of non-calcareous bedrock. Haplargids soils occur on similar positions as Mabry.



Figure 4.—Typical area of Mabray-Rock outcrop complex, 20 to 75 percent slopes.

Soil Properties and Qualities

Mabray soils

Taxonomic classification: Loamy-skeletal, carbonatic, thermic Lithic Ustic

Torriorthents

Geomorphic position: generally occurs on summits and back slopes

Parent material: residuum weathered from limestone

Slope: 20 to 75 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 5 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 35 percent

woody debris: 0 percent

bare soil: 25 percent

rock fragments

gravel: 30 percent

cobble: 10 percent

stone: 3 percent

Soil Survey of San Carlos Indian Reservation, Arizona

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.57 to 5.95 inches per hour (4.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.60 inches per hour (0.00 to 4.20 micrometers per second)

Available water capacity total inches: 1.1 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Limestone Hills 12-16" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA105AZ

Present vegetation: black grama, Fremont indigobush, blue threeawn, jojoba, sideoats grama, blue paloverde, false mesquite, ocotillo, perennial forbs, perennial grasses, slim tridens, twinberry

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,100 feet north and 50 feet west of southeast corner of Section 20, Township 4 S, Range 17 E

Geographic Coordinate System:

33° 4' 8.53" north, 110° 37' 18.16" west

A—0 to 1 inch (0 to 3 cm); brown (10YR 5/3) very gravelly loam, brown (10YR 4/3), moist; 17 percent clay; moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; few very fine roots; many very fine and common medium pores; 40 percent gravel; violently effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

AC—1 to 4 inches (3 to 10 cm); pale brown (10YR 6/3) very gravelly loam, brown (10YR 4/3), moist; 22 percent clay; moderate fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine and common medium roots; many very fine pores; 45 percent gravel and 10 percent cobble; violently effervescent, 38 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear wavy boundary.

Ck—4 to 12 inches (10 to 30 cm); pale brown (10YR 6/3) very gravelly loam, brown (10YR 5/3), moist; 25 percent clay; massive; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine pores; few faint carbonate coats on rock fragments; 45 percent gravel and 5 percent cobble; violently effervescent, 45 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; abrupt wavy boundary.

R—12 to 60 inches (30 to 152 cm); limestone bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 15 to 25 percent

Rock fragments: 35 to 65 percent

Calcium carbonate equivalent: 10 to 50 percent

Effervescence: violent

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Reaction (pH): moderately alkaline to strongly alkaline (7.9 to 9.0)

A horizons

Hue: 7.5YR, 10YR

Value: 4 to 6 dry, 4 to 5 moist

Chroma: 2 to 4, dry or moist

Texture: loam, sandy loam

Rock fragments: 35 to 60 percent

Ck horizon

Hue: 7.5YR, 10YR

Value: 4 to 8 dry, 4 to 7 moist

Chroma: 2 to 4, dry or moist

Texture: loam, sandy loam

Rock fragments: 35 to 60 percent

R horizon

Bedrock is limestone

Rock outcrop

Slope: 20 to 75 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops and ledges of Mississippian and Pennsylvanian limestone. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

50—Nahda-Delnorte complex, 1 to 10 percent slopes

Map Unit Setting

Landform(s): fan terraces

Elevation: 2,500 to 3,400 feet (762 to 1,036 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 64 to 70 degrees F (17.8 to 21.1 degrees C)

Mean annual soil temperature: 66 to 72 degrees F (18.9 to 22.2 degrees C)

Frost-free period: 220 to 280 days

Major Land Resource Area: 40-Sonoran Basin and Range

Land Resource Unit: 40-1 Upper Sonoran Desert Shrub

Map Unit Composition

Nahda and similar soils: 60 percent

Delnorte and similar soils: 30 percent

Minor components: Topawa and Whitecliff soils occur on less sloping areas.

Stagecoach soils, soils with less than 35 percent rock fragments, or soils that have pans above 20 inches occur on similar positions as Nahda and Delnorte soils. Queenecreek soils and Riverwash occur in drainageways.

Soil Properties and Qualities

Nahda soils

Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic Argic Petrocalcids

Geomorphic position: generally occurs on summits and shoulder slopes

Parent material: mixed fan alluvium

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Slope: 1 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 5 percent

bare soil: 10 percent

rock fragments

gravel: 70 percent

cobble: 20 percent

Depth to restrictive feature(s): 20 to 40 inches to petrocalcic

Drainage class: well drained

Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 2.6 (low)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Clay Loam Upland 10-13" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R040XA120AZ

Present vegetation: creosotebush, whitethorn, false mesquite, pricklypear, littleleaf paloverde, annual grasses, ratany, Rothrock's grama, mesa threeawn, saguaro

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: Typical pedon description is from Soil Survey of Eastern Pinal and Southern Gila Counties, Arizona; about 1,900 feet north and 500 feet west of the southeast corner of Section 26, Township 10 S, Range 17 E

Geographic Coordinate System:

32° 32' 13.00" north, 110° 34' 9.00" west

A—0 to 2 inches (0 to 5 cm); strong brown (7.5YR 5/6) very gravelly clay loam, brown (7.5YR 4/4), moist; 29 percent clay; weak thin platy parting to moderate fine granular structure; soft, very friable, moderately sticky and moderately plastic; common very fine and few medium roots; common fine pores; 40 percent gravel and 2 percent cobble; noneffervescent; slightly alkaline, pH 7.6; abrupt smooth boundary.

Bt1—2 to 16 inches (5 to 41 cm); dark red (2.5YR 3/6) extremely gravelly clay, yellowish red (5YR 4/6), moist; 50 percent clay; moderate very fine and fine subangular blocky and moderate medium subangular blocky structure; slightly hard, friable, very sticky and very plastic; many very fine and few medium roots; few very fine pores; many continuous distinct clay films on faces of peds and rock fragments;

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40 percent gravel and 20 percent cobble; noneffervescent; slightly alkaline, pH 7.6; clear wavy boundary.

Bt2—16 to 27 inches (41 to 69 cm); dark red (2.5YR 3/6) clay, yellowish red (5YR 4/6), moist; 52 percent clay; strong medium prismatic parting to strong fine and medium angular blocky structure; hard, firm, very sticky and very plastic; many very fine roots; few very fine pores; many distinct pressure faces; many continuous distinct clay films on faces of peds, rock fragments, and surfaces along pores; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.6; abrupt wavy boundary.

Bkm—27 to 60 inches (69 to 152 cm); extremely hard; violently effervescent; cemented material, thin laminar; indurated; petrocalcic.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 40 to 65 percent

Rock fragments: 35 to 60 percent

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

A horizon

Hue: 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 6 dry, 3 to 4 moist

Texture: sandy loam, clay loam, loam

Effervescence: none

Bt horizons

Hue: 5YR, 2.5YR

Value: 3 to 5 dry, 3 to 4 moist

Chroma: 4 to 6 dry, 3 to 6 moist

Texture: clay, sandy clay, clay loam, sandy clay loam

Calcium carbonate equivalent: 0 to 10 percent

Bkm horizon

Continuous, indurated calcium carbonate, 1 to 6 feet thick

Some pedons are underlain by consolidated (diatomite and calcareous and gypsiferous sedimentary bedrock) and nonconsolidated (lacustrine sediments) materials above 60 inches.

Delnorte soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic, shallow Calcic Petrocalcids

Geomorphic position: generally occurs on summits and back slopes

Parent material: mixed fan alluvium

Slope: 1 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

Soil Survey of San Carlos Indian Reservation, Arizona

woody debris: 5 percent

bare soil: 10 percent

rock fragments

gravel: 70 percent

cobble: 20 percent

Depth to restrictive feature(s): 7 to 20 inches to petrocalcic

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 0.6 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Limy Upland 10-13" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R040XA111AZ

Present vegetation: creosotebush, pricklypear, littleleaf paloverde, annual grasses, ratany, Englemann hedgehog cactus, barrel cactus, ocotillo, saguaro

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: Typical pedon description is from Soil Survey of Eastern Pinal and Southern Gila Counties, Arizona; about 1,900 feet north and 1,300 feet west of the southeast corner of Section 26, Township 10 S, Range 17 E

Geographic Coordinate System:

32° 32' 11.00" north, 110° 34' 14.00" west

A—0 to 1 inch (0 to 3 cm); pale brown (10YR 6/3) very gravelly sandy loam, dark yellowish brown (10YR 4/4), moist; 10 percent clay; moderate fine granular structure; soft, very friable, nonsticky and nonplastic; few very fine roots; few fine pores; 40 percent gravel; violently effervescent, 15 percent calcium carbonate equivalent; moderately alkaline, pH 8.0; clear smooth boundary.

Bk—1 to 9 inches (3 to 23 cm); pale brown (10YR 6/3) very gravelly sandy loam, dark yellowish brown (10YR 4/4), moist; 12 percent clay; moderate fine and medium subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine and few medium roots; few fine pores; many continuous distinct carbonate coats on rock fragments; many fine and medium carbonate masses; 40 percent gravel and 10 percent cobble; violently effervescent, 13 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt wavy boundary.

Bkm—9 to 60 inches (23 to 152 cm); extremely hard; violently effervescent; cemented material, thin laminar cap; indurated; petrocalcic; abrupt wavy boundary.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 18 percent

Rock fragments: 35 to 60 percent

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

A horizon

Hue: 10YR, 7.5YR
Value: 5 to 6 dry, 3 to 4 moist
Chroma: 3 to 4, dry or moist
Texture: sandy loam, fine sandy loam
Calcium carbonate equivalent: 5 to 20 percent

Bk horizons

Hue: 10YR, 7.5YR
Value: 4 to 6 dry, 4 to 5 moist
Chroma: 3 to 4, dry or moist
Texture: sandy loam, loam
Calcium carbonate equivalent: 5 to 30 percent

Bkm horizon

Continuous, indurated calcium carbonate, 1 foot to 6 feet thick

Some pedons are underlain by consolidated (diatomite and calcareous and gypsiferous sedimentary bedrock) and nonconsolidated (lacustrine sediments) materials above 60 inches.

51—Nugget-Lanque complex, 1 to 35 percent slopes

Map Unit Setting

Landform(s): alluvial fans, pediments
Elevation: 4,000 to 5,500 feet (1,219 to 1,676 meters)
Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)
Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)
Frost-free period: 160 to 210 days
Major Land Resource Area: 38-Mogollon Transition
Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Nugget and similar soils: 55 percent
Lanque and similar soils: 20 percent
Minor components: Turquoise soils occur on shoulders and back slopes. Soils with greater than 35 percent rock fragments in the particle-size control section and/or are deep to bedrock occur throughout the map unit. Rock outcrop occurs throughout the map unit. Riverwash occurs in drainageways.

Soil Properties and Qualities

Nugget soils

Taxonomic classification: Loamy, mixed, superactive, thermic, shallow Aridic Haplustalfs
Geomorphic position: generally occurs on summits and back slopes
Parent material: slope alluvium and/or residuum weathered from granite and/or granodiorite
Slope: 3 to 35 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent

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moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover: 45 percent
woody debris: 1 percent
bare soil: 10 percent
rock fragments
gravel: 50 percent
cobble: 5 percent
Depth to restrictive feature(s): 10 to 20 inches to bedrock, paralithic; 15 to 30 inches to bedrock, paralithic
Drainage class: well drained
Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 1.6 (very low)
Shrink-swell potential: about 4.0 LEP (moderate)
Flooding hazard: none
Runoff class: high
Hydrologic group: D
Ecological site name: Granitic Hills 16-20" p.z.
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.
Ecological site number: R038XB204AZ
Present vegetation: turbinella oak, singleleaf pinyon, Emory oak, oneseed juniper, Pringle manzanita, sacahuista, perennial forbs, bottlebrush squirreltail, catclaw acacia, mimosa, mountain mahogany, range ratany, skunkbush sumac, agave, banana yucca
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,760 feet north and 880 feet west of southeast corner of Section 5, Township 02S, Range 17E

Geographic Coordinate System:

33° 17' 8.90" north, 110° 37' 28.20" west

A—0 to 4 inches (0 to 10 cm); brown (7.5YR 5/3) very gravelly sandy loam, dark brown (7.5YR 3/2), moist; 16 percent clay; moderate very fine and fine granular structure; soft, very friable, slightly sticky and nonplastic; common very fine and fine roots; many very fine and fine and common medium pores; 35 percent gravel and 5 percent cobble; noneffervescent; slightly acid, pH 6.1; clear smooth boundary.

Bt—4 to 16 inches (10 to 41 cm); reddish brown (5YR 5/4) gravelly sandy clay loam, reddish brown (5YR 4/4), moist; 30 percent clay; moderate medium prismatic parting to strong medium and coarse subangular blocky structure; very hard, firm, moderately sticky and moderately plastic; common very fine and fine and few medium and coarse roots; many very fine and fine and common medium pores; few distinct dark brown (7.5YR 3/2), moist, organic stains on faces of peds; common distinct clay films on faces of peds and rock fragments; 23 percent gravel; noneffervescent; neutral, pH 6.6; clear wavy boundary.

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Crt—16 to 25 inches (41 to 64 cm); few faint clay films along fractures of bedrock; weathered granite (grus) bedrock.

Cr—25 to 60 inches (64 to 152 cm); weathered granite (grus) bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 18 to 35 percent

Rock fragments: 5 to 35 percent

Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 moist

Chroma: 2 to 3, dry or moist

Texture: sandy loam

Rock fragments: 10 to 50 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 5 to 6 dry, 4 to 5 moist

Chroma: 4 to 6, dry or moist

Texture: sandy clay loam, clay loam, loam

Rock fragments: 5 to 35 percent

Cr horizon

Bedrock is soft to hard granite or granodiorite

Nugget as used in this mapping unit is a taxadjunct to the series because it does not meet the color and/or thickness requirements for a mollic epipedon. Nugget series is Loamy, mixed, superactive, thermic, shallow Aridic Argiustolls.

Lanque soils

Taxonomic classification: Coarse-loamy, mixed, superactive, thermic Pachic

Haplustolls

Geomorphic position: generally occurs on alluvial fans along drainageways

Parent material: fan alluvium derived from granite

Slope: 1 to 8 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 70 percent

woody debris: 2 percent

bare soil: 10 percent

rock fragments

gravel: 50 percent

Drainage class: well drained

Ksat solum: 0.20 to 19.98 inches per hour (1.40 to 141.00 micrometers per second)

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Available water capacity total inches: 6.3 (moderate)

Shrink-swell potential: about 3.5 LEP (moderate)

Flooding hazard: rare

Runoff class: very low

Hydrologic group: A

Ecological site name: Loamy Swale 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB226AZ

Present vegetation: singleleaf pinyon, turbinella oak, Pringle manzanita, banana yucca, sacahuista, perennial forbs, catclaw acacia, shrubby buckwheat, bottlebrush squirreltail, algerita, broom snakeweed, mimosa, range ratany, skunkbush sumac

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 770 feet north and 260 feet west of southeast corner of Section 5, Township 2S, Range 17E

Geographic Coordinate System:

33° 16' 59.20" north, 110° 37' 20.90" west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/3) gravelly loamy sand, dark brown (7.5YR 3/3), moist; 6 percent clay; weak fine subangular blocky parting to weak very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine and common medium pores; 28 percent gravel; noneffervescent; slightly acid, pH 6.2; clear smooth boundary.

Bw1—2 to 9 inches (5 to 23 cm); brown (7.5YR 5/3) gravelly sandy loam, dark brown (7.5YR 3/3), moist; 12 percent clay; weak medium prismatic parting to weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and common medium and coarse roots; many very fine and fine and common medium pores; 20 percent gravel; noneffervescent; slightly acid, pH 6.4; clear smooth boundary.

Bw2—9 to 40 inches (23 to 101 cm); brown (7.5YR 4/2) gravelly sandy loam, dark brown (7.5YR 3/2), moist; 12 percent clay; weak coarse prismatic parting to weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and common medium and coarse roots; many very fine and fine and common medium pores; 15 percent gravel; noneffervescent; slightly acid, pH 6.2; gradual wavy boundary.

Bw3—40 to 65 inches (101 to 165 cm); brown (7.5YR 4/4) gravelly sandy clay loam, dark brown (7.5YR 3/4), moist; 22 percent clay; weak coarse prismatic parting to moderate medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine and few medium and coarse roots; many very fine and fine and common medium pores; 25 percent gravel; noneffervescent; neutral, pH 6.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 15 percent

Rock fragments: less than 35 percent

Organic matter: 1 to 3 percent

Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

A horizon

Hue: 7.5YR, 10YR

Value: 5 dry, 3 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: sand, loamy sand

Rock fragments: 10 to 50 percent

Upper B horizons

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: sandy loam

Rock fragments: 15 to 35 percent

Lower B or C horizons

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Texture: loamy sand, sandy loam, sandy clay loam

Rock fragments: 25 to 50 percent

52—Oracle-Romero-Combate complex, 1 to 35 percent slopes

Map Unit Setting

Landform(s): alluvial fans, pediments (fig. 5)

Elevation: 3,000 to 5,000 feet (914 to 1,524 meters)

Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)

Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)

Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)

Frost-free period: 180 to 230 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-1 Lower Interior Chaparral

Map Unit Composition

Oracle and similar soils: 35 percent

Romero and similar soils: 27 percent

Combate and similar soils: 20 percent

Minor components: Rock outcrop occurs throughout map unit. Soils that are more than 40 inches deep to bedrock occur on similar positions as Oracle soils. Soils with lithic contact occur on similar positions as Oracle and Romero soils.

Soil Properties and Qualities

Oracle soils

Taxonomic classification: Loamy, mixed, superactive, thermic, shallow Ustic Haplargids

Geomorphic position: generally occurs on summits and upper back slopes

Parent material: loamy slope alluvium and/or residuum weathered from granite

Slope: 1 to 25 percent

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Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 0 percent

bare soil: 5 percent

rock fragments

gravel: 90 percent

cobble: 1 percent

stone: 1 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, paralithic

Drainage class: well drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 2.4 (very low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Granitic Hills 12-16" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA104AZ

Present vegetation: annual grasses, turbinella oak, mimosa, whitethorn acacia, algerita, juniper, mesquite, broom snakeweed, catclaw acacia, desert ceanothus, range ratany, shrubby buckwheat, yucca, sotol, other annual forbs

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,440 feet south and 43 feet east of northwest corner of Section 36, Township 1 S, Range 16 E

Geographic Coordinate System:

33° 18' 20.90" north, 110° 40' 22.90" west

A—0 to 4 inches (0 to 10 cm); brown (7.5YR 5/3) gravelly coarse sandy loam, brown (7.5YR 4/3), moist; 12 percent clay; weak fine subangular blocky parting to moderate fine and medium granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine and common medium roots; many very fine and fine and common medium pores; 30 percent gravel; noneffervescent; neutral, pH 7.0; clear smooth boundary.

Bt1—4 to 12 inches (10 to 30 cm); brown (7.5YR 5/2) gravelly sandy clay loam, brown (7.5YR 4/2), moist; 22 percent clay; moderate medium subangular blocky structure; very hard, friable, moderately sticky and moderately plastic; common very fine and fine and common medium and coarse roots; common very fine and fine and

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few medium pores; few faint clay films on rock fragments; 20 percent gravel; noneffervescent; neutral, pH 6.8; clear smooth boundary.

Bt2—12 to 19.5 inches (30 to 50 cm); strong brown (7.5YR 5/6) gravelly clay loam, strong brown (7.5YR 4/6), moist; 34 percent clay; moderate medium and coarse subangular blocky structure; very hard, firm, very sticky and very plastic; common medium and coarse roots; common very fine and fine and few medium pores; few faint clay films on faces of peds and rock fragments; 15 percent gravel; noneffervescent; neutral, pH 6.6; clear wavy boundary.

Cr—19.5 to 60 inches (50 to 152 cm); weathered granite (grus) bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 20 to 35 percent

Rock fragments: 15 to 35 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.6)

A horizon

Hue: 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: sandy loam, coarse sandy loam, loamy coarse sand

Rock fragments: 15 to 40 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 6, dry or moist

Texture: sandy clay loam, clay loam

Rock fragments: 20 to 40 percent

Cr horizon

Bedrock is soft to hard granite or granodiorite

Romero soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, nonacid, thermic, shallow Ustic Torriorthents

Geomorphic position: generally occurs on shoulders and back slopes

Parent material: loamy-skeletal residuum and/or slope alluvium derived from granite

Slope: 5 to 35 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 25 percent

woody debris: 0 percent

bare soil: 5 percent

rock fragments

gravel: 90 percent

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Depth to restrictive feature(s): 4 to 20 inches to bedrock, paralithic

Drainage class: well drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 0.4 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Granitic Hills 12-16" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA104AZ

Present vegetation: annual grasses, turbinella oak, mimosa, whitethorn acacia, algerita, juniper, mesquite, broom snakeweed, catclaw acacia, desert ceanothus, range ratany, shrubby buckwheat, yucca, sotol, other annual forbs

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,970 feet south and 1,740 feet east of the northwest corner of Section 36, Township 1 S, Range 16 E

Geographic Coordinate System:

33° 18' 15.80" north, 110° 40' 3.20" west

A1—0 to 1 inch (0 to 3 cm); brown (7.5YR 5/4) very gravelly sandy loam, brown (7.5YR 4/4), moist; 8 percent clay; weak thick platy parting to moderate fine and medium granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine and few medium pores; 40 percent gravel; noneffervescent; neutral, pH 7.0; clear smooth boundary.

A2—1 to 6 inches (3 to 15 cm); brown (7.5YR 5/4) very gravelly coarse sandy loam, brown (7.5YR 4/4), moist; 10 percent clay; weak medium and coarse subangular blocky structure; hard, friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine and few medium pores; 40 percent gravel; noneffervescent; neutral, pH 6.8; clear wavy boundary.

Cr—6 to 60 inches (15 to 152 cm); weathered granite (grus) bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 8 to 15 percent

Rock fragments: 35 to 60 percent

Effervescence: none

Reaction: slightly acid to neutral (6.1 to 7.3)

A horizon

Hue: 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: sandy loam, coarse sandy loam

Cr horizon

Bedrock is soft to hard granite or granodiorite

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Combate soils

Taxonomic classification: Coarse-loamy, mixed, superactive, nonacid, thermic Ustic
Torrifluvents

Geomorphic position: generally occurs on alluvial fans along drainageways

Parent material: fan alluvium derived from granite

Slope: 1 to 10 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 30 percent

 woody debris: 0 percent

 bare soil: 20 percent

 rock fragments

 gravel: 60 percent

Drainage class: well drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 4.9 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: rare

Runoff class: very low

Hydrologic group: A

Ecological site name: Sandy Loam 12-16" p.z. Deep

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA112AZ

Present vegetation: catclaw acacia, mesquite, annual grasses, whitethorn acacia, soap tree yucca, perennial forbs, Anderson wolfberry, broom snakeweed, graythorn, jimmyweed, buckhorn cholla, pricklypear

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,040 feet north and 1,285 feet west of southeast corner of Section 26, Township 1 S, Range 17 E

Geographic Coordinate System:

33° 18' 55.90" north, 110° 34' 26.40" west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/2) gravelly coarse sandy loam, dark brown (7.5YR 3/2), moist; 10 percent clay; weak thick platy parting to weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine and few medium pores; 18 percent gravel; noneffervescent; neutral, pH 7.0; clear smooth boundary.

C1—2 to 32 inches (5 to 81 cm); brown (7.5YR 5/4) gravelly sandy loam, brown (7.5YR 4/4), moist; 12 percent clay; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very

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fine and fine and few medium pores; 20 percent gravel; noneffervescent; neutral, pH 7.0; clear smooth boundary.

C2—32 to 45 inches (81 to 114 cm); light brown (7.5YR 6/4) stratified gravelly sand, brown (7.5YR 5/4), moist; 4 percent clay; single grain; loose, nonsticky and nonplastic; common medium roots; many very fine and fine and few medium pores; 30 percent gravel; noneffervescent; neutral, pH 7.0; clear smooth boundary.

C3—45 to 60 inches (114 to 152 cm); brown (7.5YR 5/3) gravelly sandy loam, brown (7.5YR 4/3), moist; 14 percent clay; weak coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; common medium roots; many very fine and fine pores; 15 percent gravel; noneffervescent; neutral, pH 7.2.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 18 percent

Rock fragments: 20 to 35 percent

Effervescence: none

Reaction (pH): neutral (6.6 to 7.3)

A horizon

Hue: 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: sandy loam, coarse sandy loam, loamy coarse sand, loamy sand

Rock fragments: 15 to 45 percent

C horizons

Hue: 7.5YR, 10YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 2 to 4, dry or moist

Texture: sandy loam, coarse sandy loam, loamy coarse sand, sand

Rock fragments: 5 to 40 percent

53—Oxyaquic Ustifluvents-Rafter family-Water complex, 0 to 3 percent slopes

Map Unit Setting

Landform(s): flood plains

Elevation: 4,000 to 5,800 feet (1,219 to 1,768 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Stream Segment Properties and Qualities

Segment length: sections of Bonita Creek, Eagle Creek, and Willow Creek.

Active flood plain width: 100 to 1,100 feet

Stream flow: perennial

Flooding hazard: frequent; brief (2 to 7 days)

Flood month: December-March and July-September

Water table minimum depth: 0 to 40 inches

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Water table kind: apparent

Water table present: year round

Bank entrenchment:

percent cut: 30

percent uncut: 70

vertical cut: 1 to 5 feet; averages 3 to 5 feet

Depositional bar features: dynamic system of braided bars and channels that relocate with each major flood event; height varies with the depth and velocity of flood water.

Meander pattern: irregular meander

Channel composition:

percent bedrock: 5

percent boulders: 1

percent stones: 12

percent cobbles: 23

percent gravel: 29

percent sand: 20

percent silt and clay: 10

Stability: dynamic system of braided components that aggrades and degrades seasonally.

Map Unit Composition

Oxyaquic Ustifluvents and similar soils: 55 percent

Rafter family and similar soils: 15 percent

Water: 15 percent

Minor components: Stanford and Amuzet soils occur on high benches. Loamy soils that have a water table within 60 inches occur on low benches. Riverwash occurs along the drainageways with water.

Soil Properties and Qualities

Oxyaquic Ustifluvents, thermic soils

Taxonomic classification: Oxyaquic Ustifluvents

Geomorphic position: generally occurs on low benches that border drainageways

Parent material: mixed sandy and gravelly alluvium

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 80 percent

woody debris: 0 percent

bare soil: 60 percent

rock fragments

gravel: 19 percent

cobble: 1 percent

Drainage class: moderately well drained

Ksat solum: 1.98 to 39.69 inches per hour (14.00 to 280.00 micrometers per second)

Available water capacity total inches: 1.5 (very low)

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Shrink-swell potential: about 1.0 LEP (low)

Flooding hazard: frequent

Seasonal water table minimum depth: about 40 to 60 inches

Runoff class: very low

Hydrologic group: A

Ecological site name: Platanus wrightii-Populus fremontii/Muhlenbergia rigens

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F038XB228AZ

Present vegetation: Arizona black walnut, Arizona sycamore, cottonwood, dropseed, mesquite, netleaf hackberry, perennial forbs, sideoats grama, willow

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,030 feet south and 500 feet east of northwest corner of Section 27, Township 4 S, Range 27 E

Geographic Coordinate System:

33° 3' 35.50" north, 109° 34' 11.10" west

A—0 to 4 inches (0 to 10 cm); reddish brown (5YR 4/3) gravelly sandy loam, dark reddish brown (5YR 3/3), moist; 12 percent clay; weak fine and medium subangular blocky parting to moderate fine granular structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; many very fine and fine and many medium and coarse pores; 15 percent gravel; strongly effervescent; slightly alkaline, pH 7.4; gradual smooth boundary.

C—4 to 60 inches (10 to 152 cm); reddish brown (5YR 4/3) stratified extremely gravelly coarse sand, dark reddish brown (5YR 3/3), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; common very fine and fine and many medium and coarse pores; 50 percent gravel and 20 percent cobble; slightly effervescent; slightly alkaline, pH 7.6.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 1 to 15 percent

Rock fragments: 35 to 80 percent

Effervescence: none to strong

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

A horizon

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2.5 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: fine sandy loam to coarse sand

Rock fragments: 15 to 40 percent

C horizons

Hue: 5YR, 7.5YR

Value: 3 to 4 dry, 2.5 to 3 moist

Chroma: 2 to 4, dry or moist

Texture: stratified coarse sand to loam

Rock fragments: 15 to 80 percent

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Rafter family soils

Series and series family designations are naming expedients and equal.

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Cumulic Haplustolls

Geomorphic position: generally occurs on high benches

Parent material: mixed loamy alluvium

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 45 percent

woody debris: 0 percent

bare soil: 40 percent

rock fragments

gravel: 12 percent

cobble: 3 percent

Drainage class: well drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Available water capacity total inches: 4.4 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: rare

Runoff class: very low

Hydrologic group: A

Ecological site name: Sandy Bottom 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB211AZ

Present vegetation: honey mesquite, annual grasses, singlewhorl burrobush, mat muhly, perennial forbs, sand dropseed, vine mesquite, desert willow

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 850 feet south and 15 feet east of northwest corner of Section 27, Township 4 N, Range 27 E

Geographic Coordinate System:

33° 3' 37.20" north, 109° 34' 16.80" west

A—0 to 7 inches (0 to 18 cm); brown (7.5YR 4/3) fine sandy loam, dark brown (7.5YR 3/3), moist; 6 percent clay; moderate fine and medium subangular blocky parting to moderate fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and common medium and coarse roots; many very fine and fine and common medium and coarse pores; 5 percent gravel; slightly effervescent; slightly alkaline, pH 7.8; clear smooth boundary.

Bk—7 to 19 inches (18 to 48 cm); brown (7.5YR 4/3) loam, dark brown (7.5YR 3/3), moist; 15 percent clay; weak coarse subangular blocky structure; moderately hard,

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friable, slightly sticky and nonplastic; common very fine and fine and common medium and coarse roots; many very fine and fine and common medium and coarse pores; few threadlike carbonate masses; 5 percent gravel; strongly effervescent; moderately alkaline, pH 8.0; gradual smooth boundary.

Ck—19 to 60 inches (48 to 152 cm); brown (7.5YR 4/3) stratified extremely gravelly coarse sandy loam, dark brown (7.5YR 3/3), moist; 5 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; common very fine and fine and many medium and coarse pores; few carbonate coats on bottom surfaces of rock fragments; 50 percent gravel and 20 percent cobble and 1 percent stone; strongly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 8 to 25 percent

Rock fragments: 35 to 60 percent

Effervescence: none to strong

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

A horizon

Hue: 7.5YR

Value: 4 dry, 3 moist

Chroma: 2 to 3, dry or moist

Texture: fine sandy loam, loam

B and C horizons

Hue: 7.5YR

Value: 4 dry, 3 moist

Chroma: 2 to 3, dry or moist

Texture: coarse sandy loam to loam

Water

Range in Characteristics

Water includes the perennial sections of streams such as Eagle Creek and Bonita Creek.

54—Pachic Argiustolls-Dedal-Rock outcrop complex, 8 to 35 percent slopes

Map Unit Setting

Landform(s): mountains

Elevation: 5,800 to 7,200 feet (1,768 to 2,195 meters)

Mean annual precipitation: 18 to 24 inches (457 to 610 millimeters)

Mean annual air temperature: 45 to 57 degrees F (7.0 to 13.9 degrees C)

Mean annual soil temperature: 47 to 59 degrees F (8.1 to 15.0 degrees C)

Frost-free period: 120 to 180 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-3 Interior Chaparral-Forests

Map Unit Composition

Pachic Argiustolls and similar soils: 50 percent

Dedal and similar soils: 22 percent

Soil Survey of San Carlos Indian Reservation, Arizona

Rock outcrop: 15 percent

Minor components: Brolliar soils occur throughout mapping unit.

Soil Properties and Qualities

Pachic Argiustolls soils

Taxonomic classification: Pachic Argiustolls

Geomorphic position: generally occurs on back slopes and foot slopes

Parent material: loamy and clayey colluvium derived from volcanic rock

Slope: 8 to 35 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

tree canopy cover: 50 percent

plant cover: 21 percent

organic litter: 25 percent

woody debris: 3 percent

bare soil: 10 percent

rock fragments

gravel: 20 percent

cobble: 10 percent

stone: 10 percent

boulder: 1 percent

Drainage class: well drained

Ksat solum: 0.06 to 1.98 inches per hour (0.42 to 14.00 micrometers per second)

Available water capacity total inches: 6.1 (moderate)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: high

Hydrologic group: C

Ecological site name: Pinus ponderosa-Quercus grisea/Bouteloua curtipendula-Poa fendleriana

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F038XC315AZ

Present vegetation: ponderosa pine, gray oak, alligator juniper, bullgrass, muttongrass, Fendler ceanothus, threeawn, perennial forbs

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,350 feet north and 200 feet east of southwest corner of Section 7, Township 1 S, Range 25 E

Geographic Coordinate System:

33° 21' 33.23" north, 109° 49' 42.50" west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/2) very stony loam, very dark brown (7.5YR 2.5/2), moist; 20 percent clay; moderate fine subangular blocky parting to

Soil Survey of San Carlos Indian Reservation, Arizona

moderate very fine and fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine pores; 10 percent gravel and 15 percent cobble and 10 percent stone and 1 percent boulder; noneffervescent; neutral, pH 6.8; abrupt wavy boundary.

Bt1—2 to 16 inches (5 to 41 cm); brown (7.5YR 4/2) very stony loam, dark brown (7.5YR 3/2), moist; 25 percent clay; weak coarse prismatic parting to moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine and common medium and coarse roots; many very fine and fine and common medium pores; common faint clay films on faces of peds and rock fragments and; 15 percent gravel and 15 percent cobble and 10 percent stone and 1 percent boulder; noneffervescent; neutral, pH 6.8; clear wavy boundary.

Bt2—16 to 32 inches (41 to 81 cm); brown (7.5YR 4/3) very cobbly clay loam, dark brown (7.5YR 3/3), moist; 33 percent clay; weak coarse prismatic parting to strong fine and medium subangular blocky structure; moderately hard, friable, moderately sticky and moderately plastic; common very fine and fine and few medium and coarse roots; many very fine and fine pores; common faint clay films on faces of peds and common distinct clay films on rock fragments; 20 percent gravel and 30 percent cobble and 5 percent stone; noneffervescent; neutral, pH 6.6; gradual wavy boundary.

2Bt—32 to 60 inches (81 to 152 cm); brown (7.5YR 4/3) cobbly clay, dark brown (7.5YR 3/3), moist; 42 percent clay; weak coarse prismatic parting to strong fine and medium angular blocky structure; very hard, firm, very sticky and very plastic; common very fine and fine and few medium and coarse roots; many very fine and fine pores; common faint clay films on faces of peds and common distinct clay films on rock fragments; 15 percent gravel and 10 percent cobble and 5 percent stone; noneffervescent; neutral, pH 6.6.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 25 to 45 percent

Rock fragments: 35 to 60 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 1 to 3, dry or moist

Texture: loam

Rock fragments: 25 to 60 percent

Bt horizons

Hue: 5YR, 10YR

Value: 3 to 5 dry, 2 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: loam, clay loam, clay

Rock fragments: 25 to 70 percent

2Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Texture: clay loam, clay

Soil Survey of San Carlos Indian Reservation, Arizona

Rock fragments: 15 to 60 percent

Dedal soils

Taxonomic classification: Clayey-skeletal, smectitic, mesic Lithic Argiustolls

Geomorphic position: generally occurs on summits and back slopes

Parent material: clayey residuum weathered from volcanic rock

Slope: 8 to 35 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 tree canopy cover: 50 percent

 plant cover: 20 percent

 organic litter: 25 percent

 woody debris: 5 percent

 bare soil: 5 percent

 rock fragments

 gravel: 10 percent

 cobble: 20 percent

 stone: 10 percent

 boulder: 5 percent

Depth to restrictive feature(s): 7 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.06 to 1.98 inches per hour (0.42 to 14.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 1.1 (very low)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Pinus ponderosa-Quercus grisea/Bouteloua curtipendula-Poa fendleriana

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F038XC315AZ

Present vegetation: ponderosa pine, gray oak, alligator juniper, bullgrass, muttongrass, Fendler ceanothus, threeawn, perennial forbs

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,525 feet north and 1,845 feet west of southeast corner of Section 12, Township 1 S, Range 24 E

Geographic Coordinate System:

33° 21' 25.15" north, 109° 50' 6.55" west

A—0 to 3 inches (0 to 8 cm); dark brown (7.5YR 3/2) very stony loam, very dark brown (7.5YR 2/2), moist; 22 percent clay; weak fine subangular blocky parting to

moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots; many very fine and fine pores; 10 percent gravel and 20 percent cobble and 10 percent stone and 5 percent boulder; noneffervescent; neutral, pH 6.6; abrupt smooth boundary.

Bt—3 to 12 inches (8 to 30 cm); brown (7.5YR 4/2) very stony clay loam, dark brown (7.5YR 3/2), moist; 38 percent clay; moderate medium and coarse subangular blocky structure; hard, very friable, moderately sticky and moderately plastic; common very fine and fine and common medium and coarse roots; many very fine and fine pores; common distinct clay films on rock fragments and many distinct clay films on surfaces along root channels; 10 percent gravel and 20 percent cobble and 10 percent stone and 5 percent boulder; noneffervescent; neutral, pH 6.6; clear wavy boundary.

R—12 to 60 inches (30 to 152 cm); andesite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 55 percent

Rock fragments: 35 to 65 percent

A horizon

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 3 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: loam, clay loam

Rock fragments: 15 to 65 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: clay loam, clay, silty clay

Rock fragments: 35 to 65 percent

Effervescence: none to slight

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

R horizon

Bedrock is andesite or basalt

Rock outcrop

Slope: 8 to 35 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops, ledges, and cliffs of Tertiary basalt, andesite, and other volcanic rocks. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

55—Pantak-Rock outcrop-Lampshire complex, 5 to 60 percent slopes

Map Unit Setting

Landform(s): hills, mountains

Soil Survey of San Carlos Indian Reservation, Arizona

Elevation: 2,500 to 4,500 feet (762 to 1,372 meters)

Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)

Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)

Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)

Frost-free period: 180 to 230 days

Major Land Resource Area: 41-Southeastern Arizona Basin and Range

Land Resource Unit: 41-3 Southern Arizona Semidesert Grassland

Map Unit Composition

Pantak and similar soils: 45 percent

Rock outcrop: 25 percent

Lampshire and similar soils: 15 percent

Minor components: Eskiminzin soils and soils that have less than 35 percent rock fragments in the particle-size control section occur on similar positions as Pantak soils. Bodecker soils and Riverwash occur in drainageways.

Soil Properties and Qualities

Pantak soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Lithic Ustic Haplargids

Geomorphic position: generally occurs on summits and back slopes

Parent material: residuum weathered from tuff breccia and/or andesite

Slope: 5 to 45 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 2 percent

bare soil: 8 percent

rock fragments

gravel: 35 percent

cobble: 20 percent

Depth to restrictive feature(s): 4 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 0.4 (very low)

Shrink-swell potential: about 4.0 LEP (moderate)

Flooding hazard: none

Runoff class: high

Hydrologic group: D

Ecological site name: Volcanic Hills 12-16" p.z. Loamy

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R041XC323AZ

Soil Survey of San Carlos Indian Reservation, Arizona

Present vegetation: black grama, flattop buckwheat, jojoba, sideoats grama, annual grasses, oneseed juniper, perennial forbs, pricklypear, saguaro, shrubby buckwheat, slender grama, tanglehead

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,100 feet north and 650 feet west of southeast corner of Section 21, Township 5 S, Range 18 E

Geographic Coordinate System:

32° 58' 46.80" north, 110° 30' 11.90" west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/3) very gravelly sandy loam, dark brown (7.5YR 3/3), moist; 13 percent clay; weak thin platy parting to moderate very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; common very fine pores; 40 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt—2 to 5 inches (5 to 13 cm); brown (7.5YR 4/3) very gravelly sandy clay loam, dark brown (7.5YR 3/3), moist; 25 percent clay; moderate fine and medium subangular blocky structure; slightly hard, very friable, moderately sticky and moderately plastic; many very fine and fine roots; many very fine and fine pores; many distinct clay films on faces of peds and rock fragments; 45 percent gravel and 10 percent cobble; noneffervescent; slightly alkaline, pH 7.6; abrupt wavy boundary.

R—5 to 60 inches (13 to 152 cm); tuffaceous bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 20 to 35 percent

Rock fragments: 35 to 60 percent

Effervescence: none

Reaction: neutral to slightly alkaline (6.6 to 7.8)

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: loam, sandy loam

Rock fragments: 30 to 60 percent

Bt horizons

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay loam, sandy clay loam

Rock fragments: 35 to 65 percent

R horizon

Bedrock is andesite or tuff

Rock outcrop

Slope: 5 to 60 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops, ledges, and cliffs of Tertiary volcanic tuff. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

Soil Survey of San Carlos Indian Reservation, Arizona

Lampshire soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, nonacid, thermic Lithic Ustic Torriorthents

Geomorphic position: generally occurs on summits and back slopes

Parent material: residuum weathered from tuff breccia and/or andesite

Slope: 5 to 60 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 5 percent

moss: 30 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

woody debris: 0 percent

bare soil: 5 percent

rock fragments

gravel: 55 percent

cobble: 20 percent

stone: 1 percent

Depth to restrictive feature(s): 4 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 0.4 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Volcanic Hills 12-16" p.z. Loamy

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R041XC323AZ

Present vegetation: shrubby buckwheat, mesquite, beggartick threeawn, Emory oak, hairy grama, sideoats grama, sotol, oneseed juniper, pricklypear, mimosa

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 900 feet north and 230 feet west of southeast corner of Section 21, Township 5 S, Range 18 E

Geographic Coordinate System:

32° 58' 45.14" north, 110° 30' 6.73" west

A—0 to 6 inches (0 to 15 cm); brown (7.5YR 5/4) very gravelly sandy loam, dark brown (7.5YR 3/4), moist; 15 percent clay; moderate very fine and fine subangular blocky parting to moderate very fine and fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine and common medium roots; many very fine and fine pores; 40 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

R—6 to 60 inches (15 to 152 cm); tuffaceous bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 10 to 20 percent

Rock fragments: 35 to 65 percent

Effervescence: none

Reaction: slightly acid to slightly alkaline (6.1 to 7.8)

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: loam, sandy loam

R horizon

Bedrock is andesite or tuff

56—Paymaster family and Typic Fluvaquents soils and Riverwash, 0 to 3 percent slopes

Map Unit Setting

Landform(s): flood plains

Elevation: 5,500 to 7,000 feet (1,676 to 2,134 meters)

Mean annual precipitation: 18 to 24 inches (457 to 610 millimeters)

Mean annual air temperature: 45 to 57 degrees F (7.2 to 13.9 degrees C)

Mean annual soil temperature: 47 to 59 degrees F (8.3 to 15.0 degrees C)

Frost-free period: 120 to 180 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-3 Interior Chaparral-Forests

Stream Segment Properties and Qualities

Segment length: about 7 miles of Cienega Creek from Cienega Tank to Maggie Jones Tank.

Active flood plain width: 100 to 1,000 feet

Stream flow: intermittent

Flooding hazard: frequent; brief (2 to 7 days)

Flood month: December-March and July-September

Water table minimum depth: 0 to 12 inches

Water table kind: apparent

Water table present: year round

Bank entrenchment:

percent cut: 30

percent uncut: 70

vertical cut: 1 to 5 feet; averages 3 to 5 feet

Depositional bar features: dynamic system of braided bars and channels that relocate with each major flood event; height varies with the depth and velocity of flood water.

Meander pattern: irregular meander

Channel composition:

percent bedrock: 5

percent boulders: 1

percent stones: 12

Soil Survey of San Carlos Indian Reservation, Arizona

percent cobbles: 23

percent gravel: 34

percent sand: 15

percent silt and clay: 10

Stability: dynamic system of braided components that aggrades and degrades seasonally.

Map Unit Composition

Paymaster family and similar soils

Typic Fluvaquents and similar soils

Riverwash

Minor components: Loamy-skeletal Cumulic Haplustolls occur on higher benches.

Gavilan family soils occur on higher foot slopes. Rock outcrop occurs as ledges in and along the drainageways.

This is an undifferentiated map unit. These components are not consistently associated geographically. At least one component is present in every delineation, but each delineation can have any combination of the components. This map unit is not consistent over time. The components of this map unit consist of a dynamic system of braided bars and channels. The active stream dynamics will cause these components to shift locations. During severe rainfall events, the channel will cut and fill throughout its length.

Soil Properties and Qualities

Paymaster family soils

Series and series family designations are naming expedients and equal.

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Cumulic Haplustolls

Geomorphic position: generally occurs on higher benches

Parent material: coarse-loamy alluvium derived from volcanic and sedimentary rock

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

tree canopy cover: 25 percent

plant cover: 35 percent

organic litter: 3 percent

woody debris: 10 percent

bare soil: 10 percent

rock fragments

gravel: 20 percent

Depth to restrictive feature(s): 45 to 80 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)

Available water capacity total inches: 5.3 (moderate)

Soil Survey of San Carlos Indian Reservation, Arizona

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: rare

Runoff class: very low

Hydrologic group: A

Ecological site name: Pinus ponderosa-Quercus grisea/Bouteloua curtipendula-Poa fendleriana

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F038XC315AZ

Present vegetation: Gambel oak, alligator juniper, blue grama, bottlebrush squirreltail, perennial forbs, ponderosa pine, sideoats grama

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,770 feet north and 1,770 feet west of southeast corner of Section 28, Township 1 S, Range 26 E

Geographic Coordinate System:

33° 18' 52.30" north, 109° 40' 48.90" west

A—0 to 3 inches (0 to 8 cm); brown (7.5YR 5/2) gravelly sandy loam, dark brown (7.5YR 3/2), moist; 12 percent clay; weak medium and coarse subangular blocky parting to weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine and common medium and coarse roots; common very fine and fine and common medium and coarse pores; 18 percent gravel; noneffervescent; slightly acid, pH 6.4; gradual smooth boundary.

Bw1—3 to 18 inches (8 to 46 cm); brown (7.5YR 4/2) sandy loam, dark brown (7.5YR 3/2), moist; 12 percent clay; weak medium and coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine and common medium and coarse roots; common very fine and fine and few medium and coarse pores; 5 percent gravel; noneffervescent; slightly acid, pH 6.4; gradual smooth boundary.

Bw2—18 to 27 inches (46 to 69 cm); brown (7.5YR 4/3) very gravelly sandy loam, dark brown (7.5YR 3/3), moist; 16 percent clay; weak medium and coarse subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common very fine and fine and common medium and coarse roots; common very fine and fine and few medium and coarse pores; 35 percent gravel; noneffervescent; neutral, pH 6.6; gradual smooth boundary.

C—27 to 50 inches (69 to 127 cm); reddish brown (5YR 4/3) very gravelly coarse sandy loam, dark reddish brown (5YR 3/3), moist; 8 percent clay; massive; moderately hard, friable, nonsticky and nonplastic; common very fine and fine and common medium and coarse roots; common very fine and fine and common medium and coarse pores; 40 percent gravel and 2 percent cobble; noneffervescent; neutral, pH 6.6; clear smooth boundary.

R—50 to 60 inches (127 to 152 cm); Conglomerate bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 8 to 13 percent

Rock fragments: 5 to 35 percent

Thickness of mollic epipedon: greater than 20 inches

Soil Survey of San Carlos Indian Reservation, Arizona

Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 moist

Chroma: 2, dry or moist

Texture: sandy loam, fine sandy loam

Rock fragments: 5 to 18 percent

B horizons

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: sandy loam, loam

Rock fragments: 5 to 40 percent

C horizons

Hue: 5YR, 7.5YR, 10YR

Value: 4 to 6 dry, 3 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: coarse sandy loam, sandy loam

Rock fragments: 5 to 50 percent

R horizons(where present)

Bedrock is conglomerate or volcanic

Typic Fluvaquents soils

Taxonomic classification: Typic Fluvaquents

Geomorphic position: generally occurs on lowest benches that border drainageways

Parent material: sandy and gravelly alluvium derived from volcanic and sedimentary rock

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

tree canopy cover: 10 percent

plant cover: 40 percent

organic litter: 0 percent

woody debris: 0 percent

bare soil: 15 percent

rock fragments

gravel: 10 percent

cobble: 5 percent

stone: 10 percent

boulder: 10 percent

Drainage class: poorly drained

Ksat solum: 1.98 to 39.69 inches per hour (14.00 to 280.00 micrometers per second)

Available water capacity total inches: 1.9 (very low)

Soil Survey of San Carlos Indian Reservation, Arizona

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: frequent

Seasonal water table minimum depth: about 0 to 20 inches

Runoff class: medium

Hydrologic group: D

Ecological site name: *Platanus wrightii*-*Populus angustifolia*/*Rhus*/*Elymus*-*Juncus*

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F038XC312AZ

Present vegetation: other grasslikes, rush, sedge

Land capability (non irrigated): 6w

Typical Profile

Location

Public Land Survey: 1,700 feet north and 2,050 feet west of southeast corner of Section 29, Township 1 S, Range 26 E

Geographic Coordinate System:

33° 18' 51.40" north, 109° 41' 54.70" west

A—0 to 4 inches (0 to 10 cm); grayish brown (10YR 5/2) gravelly loamy sand, dark grayish brown (10YR 4/2), moist; 6 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and common medium and coarse roots; many very fine and fine and common medium and coarse pores; 10 percent prominent dark reddish brown (5YR 3/2), moist, masses of reduced iron and 20 percent prominent reddish brown (5YR 4/4), moist, masses of oxidized iron; 15 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 6.8; clear smooth boundary.

Cg1—4 to 12 inches (10 to 30 cm); gray (10YR 5/1) cobbly fine sandy loam, dark gray (10YR 4/1), moist; 10 percent clay; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and common medium and coarse roots; many very fine and fine and common medium and coarse pores; 10 percent prominent dark reddish brown (5YR 3/2), moist, masses of reduced iron and 20 percent prominent reddish brown (5YR 4/4), moist, masses of oxidized iron; 15 percent gravel and 15 percent cobble; noneffervescent; slightly acid, pH 6.2; clear smooth boundary.

Cg2—12 to 25 inches (30 to 64 cm); dark grayish brown (10YR 4/2) stratified extremely stony loamy coarse sand, very dark grayish brown (10YR 3/2), moist; 4 percent clay; single grain; loose, nonsticky and nonplastic; few medium and coarse roots; common medium and coarse pores; 10 percent prominent reddish brown (5YR 4/4), moist, masses of oxidized iron around rock fragments; 25 percent gravel and 20 percent cobble and 20 percent stone; noneffervescent; slightly acid, pH 6.4; clear smooth boundary.

Cg3—25 to 60 inches (64 to 152 cm); dark grayish brown (10YR 4/2) stratified extremely stony coarse sand, very dark grayish brown (10YR 3/2), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few medium and coarse roots; common medium and coarse pores; 25 percent gravel and 20 percent cobble and 20 percent stone; noneffervescent; slightly acid, pH 6.4.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: less than 10 percent

Rock fragments: 45 to 65 percent

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Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

A and/or upper C horizon

Hue: 7.5YR, 10YR

Value: 5 dry, 4 moist

Chroma: 1 to 2, dry or moist

Texture: sandy loam, fine sandy loam, loamy sand, sand

Rock fragments: 20 to 30 percent

Lower C horizons

Hue: 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2, dry or moist

Texture: loamy sand, loamy coarse sand, coarse sand

Rock fragments: 50 to 60 percent

Riverwash

Slope: 0 to 3 percent

Range in Characteristics

Riverwash consists of stratified sands, gravels, and cobbles from numerous sources. This material is part of a dynamic system of braided bars and channels. This material is not stable and is subject to shifting and sorting. It is usually dry but can be transformed into a temporary water course or a short-lived torrent after a heavy rain within the watershed. In very wet years, surface water can cover Riverwash for part of the year. Riverwash does not usually support vegetation because the material is constantly shifted and scoured.

57—Paymaster family-Water-Oxyaquic Ustifluvents complex, 0 to 3 percent slopes

Map Unit Setting

Landform(s): flood plains

Elevation: 5,200 to 6,600 feet (1,585 to 2,012 meters)

Mean annual precipitation: 18 to 24 inches (457 to 610 millimeters)

Mean annual air temperature: 45 to 57 degrees F (7.2 to 13.9 degrees C)

Mean annual soil temperature: 47 to 59 degrees F (8.3 to 15.0 degrees C)

Frost-free period: 120 to 180 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-3 Interior Chaparral- Forests

Stream Segment Properties and Qualities

Segment length: about 77 miles of the Black River flowing west from survey boundary.

Active flood plain width: 100 to 1,300 feet

Stream flow: perennial

Flooding hazard: frequent; brief (2 to 7 days)

Flood month: December-March and July-September

Water table minimum depth: 0 to 20 inches

Water table kind: apparent

Water table present: year round

Bank entrenchment:

percent cut: 25

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percent uncut: 75

vertical cut: 1 to 5 feet; averages 3 to 5 feet

Depositional bar features: dynamic system of braided bars and channels that relocate with each major flood event; height varies with the depth and velocity of flood water.

Meander pattern: irregular meander

Channel composition:

percent bedrock: 10

percent boulders: 3

percent stones: 12

percent cobbles: 23

percent gravel: 27

percent sand: 15

percent silt and clay: 10

Stability: dynamic system of braided components that aggrades and degrades seasonally.

Map Unit Composition

Paymaster family and similar soils: 30 percent

Water: 30 percent

Oxyaquic Ustifluvents and similar soils: 20 percent

Minor components: Soils in a loamy-skeletal textural family occur on higher benches.

Gavilan family soils occur on higher foot slopes. Riverwash occurs along the drainageways.

Soil Properties and Qualities

Paymaster family soils

Series and series family designations are naming expedients and equal.

Taxonomic classification: Coarse-loamy, mixed, superactive, mesic Cumulic

Haplustolls

Geomorphic position: generally occurs on higher benches

Parent material: coarse-loamy alluvium derived from volcanic and sedimentary rock

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

tree canopy cover: 55 percent

plant cover: 80 percent

organic litter: 3 percent

woody debris: 5 percent

bare soil: 5 percent

rock fragments

gravel: 5 percent

cobble: 2 percent

Drainage class: well drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 5.5 (moderate)

Shrink-swell potential: about 1.5 LEP (low)

Soil Survey of San Carlos Indian Reservation, Arizona

Flooding hazard: rare

Runoff class: very low

Hydrologic group: A

Ecological site name: Pinus ponderosa-Quercus grisea/Bouteloua curtipendula-Poa fendleriana

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F038XC315AZ

Present vegetation: Arizona black walnut, Gambel oak, alligator juniper, blue grama, bottlebrush squirreltail, deergrass, perennial forbs, ponderosa pine, sideoats grama

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 288 feet south and 1,760 feet west of northeast corner of Section 11, Township 2 N, Range 25 E

Geographic Coordinate System:

33° 32' 15.00" north, 109° 42' 26.10" west

A—0 to 5.5 inches (0 to 14 cm); very dark grayish brown (10YR 3/2) sandy loam, very dark brown (10YR 2/2), moist; 14 percent clay; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; common very fine and fine pores; 5 percent gravel and 2 percent cobble; noneffervescent; neutral, pH 6.6; clear smooth boundary.

Bw1—5.5 to 24 inches (14 to 61 cm); dark brown (7.5YR 3/3) sandy loam, very dark brown (7.5YR 2.5/3), moist; 16 percent clay; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine and fine and common medium and coarse roots; common very fine and fine and common medium and coarse pores; 3 percent gravel and 2 percent cobble; noneffervescent; neutral, pH 6.8; gradual smooth boundary.

Bw2—24 to 36 inches (61 to 91 cm); brown (7.5YR 4/3) sandy loam, dark brown (7.5YR 3/3), moist; 16 percent clay; weak medium subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine and fine and common medium and coarse roots; common very fine and fine and common medium and coarse pores; 3 percent gravel and 1 percent cobble; noneffervescent; neutral, pH 7.0; clear smooth boundary.

Bw3—36 to 47.5 inches (91 to 121 cm); brown (7.5YR 4/3) gravelly sandy loam, dark brown (7.5YR 3/3), moist; 16 percent clay; weak medium subangular blocky structure; soft, very friable, slightly sticky and nonplastic; few medium and coarse roots; common very fine and fine and common medium and coarse pores; 25 percent gravel; noneffervescent; neutral, pH 7.0; clear smooth boundary.

C—47.5 to 60 inches (121 to 152 cm); dark brown (7.5YR 3/3) stratified very gravelly loamy sand, very dark brown (7.5YR 2.5/3), moist; 8 percent clay; single grain; loose, nonsticky and nonplastic; few medium and coarse roots; common very fine and fine and common medium and coarse pores; 35 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 6.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 8 to 18 percent

Rock fragments: 2 to 35 percent

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Thickness of mollic epipedon: greater than 20 inches

Effervescence: none

Reaction (pH): neutral or slightly alkaline (6.6 to 7.8)

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 4 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: sandy loam, fine sandy loam

Rock fragments: 1 to 15 percent

Bw horizons

Hue: 7.5YR, 10YR

Value: 3 to 4 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: sandy loam, fine sandy loam

Rock fragments: 1 to 35 percent

C horizon

Hue: 7.5YR, 10YR

Value: 3 to 4 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: stratified coarse sand to sandy loam

Rock fragments: 35 to 70 percent

Water

Range in Characteristics

Water includes the Black River.

Oxyaquic Ustifluvents, mesic soils

Taxonomic classification: Oxyaquic Ustifluvents

Geomorphic position: generally occurs on lowest benches adjacent to Riverwash and Water

Parent material: sandy and gravelly alluvium derived from volcanic and sedimentary rock

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

tree canopy cover: 40 percent

plant cover: 40 percent

organic litter: 0 percent

woody debris: 3 percent

bare soil: 20 percent

rock fragments

gravel: 30 percent

cobble: 5 percent

stone: 2 percent

Drainage class: moderately well drained

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Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 2.3 (very low)

Shrink-swell potential: about 1.0 LEP (low)

Flooding hazard: frequent

Seasonal water table minimum depth: about 20 to 40 inches

Runoff class: very low

Hydrologic group: A

Ecological site name: Platanus wrightii-Populus angustifolia/Rhus/Elymus-Juncus

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F038XC312AZ

Present vegetation: sideoats grama, blue grama, mat muhly, deergrass, Arizona alder, bigtooth maple, sedge, perennial forbs

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 380 feet north and 1,620 feet west of southeast corner of Section 2, Township 2 N, Range 25 E

Geographic Coordinate System:

33° 32' 21.70" north, 109° 42' 24.50" west

A—0 to 2 inches (0 to 5 cm); dark brown (7.5YR 3/2) gravelly fine sandy loam, very dark brown (7.5YR 2.5/2), moist; 7 percent clay; weak fine subangular blocky parting to weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; common very fine and fine and common medium and coarse pores; 25 percent gravel and 5 percent cobble and 2 percent stone; noneffervescent; neutral, pH 6.8; clear smooth boundary.

C1—2 to 24 inches (5 to 61 cm); dark brown (7.5YR 3/2) stratified very cobbly coarse sand, very dark brown (7.5YR 2/2), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and fine and common medium and coarse roots; common very fine and fine and common medium and coarse pores; 25 percent gravel and 20 percent cobble; noneffervescent; neutral, pH 6.8; clear smooth boundary.

C2—24 to 60 inches (61 to 152 cm); dark brown (7.5YR 3/3) stratified very cobbly loamy sand, very dark brown (7.5YR 2.5/3), moist; 8 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and fine and common medium and coarse roots; common very fine and fine and common medium and coarse pores; 25 percent gravel and 20 percent cobble; noneffervescent; neutral, pH 6.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 1 to 15 percent

Rock fragments: 35 to 70 percent

Effervescence: none

Reaction (pH): neutral (6.6 to 7.3)

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 4 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: fine sandy loam or sandy loam
Rock fragments: 10 to 35 percent

C horizons

Hue: 7.5YR, 10YR
Value: 3 to 4 dry, 2 to 3 moist
Chroma: 2 to 3, dry or moist
Texture: stratified coarse sand to fine sandy loam
Rock fragments: 35 to 70 percent

58—Popcorn soils-Rock outcrop complex, 10 to 50 percent slopes

Map Unit Setting

Landform(s): hills
Elevation: 4,000 to 5,800 feet (1,219 to 1,768 meters)
Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)
Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)
Frost-free period: 160 to 210 days
Major Land Resource Area: 38-Mogollon Transition
Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Popcorn and similar soils: 25 percent
Popcorn, north aspect and similar soils: 25 percent
Rock outcrop: 25 percent
Minor components: Showlow soils occur on higher summits in the Whitetail formation. Loamy soils that are greater than 60 inches deep to bedrock occur on lower foot slopes and drainageways. Clayey soils that are shallow to bedrock occur on narrow summits.

Soil Properties and Qualities

Popcorn soils

Taxonomic classification: Loamy-skeletal, carbonatic, thermic Aridic Lithic Ustorthents
Geomorphic position: south and west facing aspects of narrow summits and back slopes

Parent material: slope alluvium and/or residuum weathered from limestone

Slope: 10 to 50 percent

Surface cover:

Biological crust
 cyanobacteria: 0 percent
 lichen: 0 percent
 moss: 0 percent
Chemical crust
 salt: 0 percent
 gypsum: 0 percent
Physical cover
 canopy plant cover: 40 percent
 woody debris: 2 percent
 bare soil: 15 percent
 rock fragments

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gravel: 50 percent

cobble: 20 percent

Depth to restrictive feature(s): 4 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.20 to 0.57 inches per hour (1.40 to 4.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 1.3 (very low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Limestone Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB205AZ

Present vegetation: singleleaf pinyon, oneseed juniper, sideoats grama, threeawn, turbinella oak, pointleaf manzanita, cane beardgrass, New Mexico feathergrass, perennial forbs, yucca

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,490 feet north and 890 feet west of the southeast corner of Section 11, Township 4N, Range 20E

Geographic Coordinate System:

33° 42' 9.00" north, 110° 13' 23.80" west

A—0 to 3 inches (0 to 8 cm); brown (7.5YR 5/3) very gravelly clay loam, brown (7.5YR 4/3), moist; 32 percent clay; weak fine subangular blocky parting to moderate fine and medium granular structure; soft, very friable, moderately sticky and moderately plastic; common very fine and fine roots; common very fine and fine and common medium pores; 35 percent gravel and 5 percent cobble; violently effervescent, 44 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; clear wavy boundary.

AC—3 to 13 inches (8 to 33 cm); brown (7.5YR 5/2) very gravelly clay loam, brown (7.5YR 4/2), moist; 34 percent clay; moderate medium and coarse subangular blocky structure; hard, friable, moderately sticky and moderately plastic; common very fine and fine and common medium roots; common very fine and fine and few medium pores; 45 percent gravel and 5 percent cobble; violently effervescent, 44 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; clear wavy boundary.

R—13 to 60 inches (33 to 152 cm); limestone bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 20 to 35 percent

Rock fragments: 35 to 70 percent

Calcium carbonate equivalent: more than 40 percent based on whole soil less than 20 mm

Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 8.8)

A horizon

Hue: 7.5YR, 10YR

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Value: 4 to 7 dry, 3 to 5 moist
Chroma: 2 to 3, dry or moist
Texture: loam, clay loam
Rock fragments: 25 to 70 percent

AC or C horizon

Hue: 7.5YR, 10YR
Value: 4 to 8 dry, 3 to 7 moist
Chroma: 2 to 4, dry or moist
Texture: loam, clay loam
Rock fragments: 25 to 70 percent

R horizon

Bedrock is limestone

Popcorn, north aspect soils

Taxonomic classification: Loamy-skeletal, carbonatic, thermic Aridic Lithic
Ustorthents

Geomorphic position: north and east facing aspects of narrow summits and back slopes

Parent material: slope alluvium and/or residuum weathered from limestone

Slope: 10 to 50 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent

Chemical crust

salt: 0 percent
gypsum: 0 percent

Physical cover

canopy plant cover: 50 percent
woody debris: 0 percent
bare soil: 15 percent
rock fragments
gravel: 70 percent
cobble: 2 percent

Depth to restrictive feature(s): 4 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.20 to 0.57 inches per hour (1.40 to 4.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 0.7 (very low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Limestone Hills 20-24"

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XC318AZ

Present vegetation: Emory oak, yucca, bullgrass, mountain mahogany, oneseed juniper, perennial forbs, pointleaf manzanita, sacahuista, sideoats grama, singleleaf pinyon, threeawn, turbinella oak

Soil Survey of San Carlos Indian Reservation, Arizona

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,700 feet south and 0 feet west of the northeast corner of Section 22, Township 4.5N, Range 19E

Geographic Coordinate System:

33° 45' 59.20" north, 110° 20' 24.50" west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/3) extremely gravelly clay loam, dark brown (7.5YR 3/3), moist; 32 percent clay; weak fine subangular blocky parting to moderate fine and medium granular structure; soft, very friable, moderately sticky and moderately plastic; common very fine and fine roots; common very fine and fine and common medium pores; 60 percent gravel and 1 percent cobble; violently effervescent, 50 percent calcium carbonate equivalent; moderately alkaline, pH 8.2 by Thymol-blue; clear wavy boundary.

AC—2 to 12 inches (5 to 30 cm); light brown (7.5YR 6/3) extremely gravelly clay loam, brown (7.5YR 4/3), moist; 33 percent clay; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky and moderately plastic; common very fine and fine and common medium roots; common very fine and fine and few medium pores; 60 percent gravel and 1 percent cobble; violently effervescent, 50 percent calcium carbonate equivalent; moderately alkaline, pH 8.4 by Thymol-blue; clear wavy boundary.

R—12 to 60 inches (30 to 152 cm); limestone bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 20 to 35 percent

Rock fragments: 35 to 70 percent

Calcium carbonate equivalent: more than 40 percent based on whole soil less than 20 mm

Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 8.8)

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 7 dry, 3 to 5 moist

Chroma: 2 to 3, dry or moist

Texture: loam, clay loam

Rock fragments: 25 to 70 percent

AC or C horizon

Hue: 7.5YR, 10YR

Value: 4 to 8 dry, 3 to 7 moist

Chroma: 2 to 4, dry or moist

Texture: loam, clay loam

Rock fragments: 25 to 70 percent

R horizon

Bedrock is limestone

Rock outcrop

Slope: 10 to 50 percent

Range in Characteristics

Rock outcrop consists of barren rock of Pennsylvanian, Mississippian, or Devonian age limestone that occurs as ledges on back slopes. It also includes areas where the

depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

59—Queencreek soils and Riverwash, 0 to 5 percent slopes

Map Unit Setting

Landform(s): flood plains

Elevation: 1,800 to 3,800 feet (549 to 1,158 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 64 to 70 degrees F (17.8 to 21.1 degrees C)

Mean annual soil temperature: 66 to 72 degrees F (18.9 to 22.2 degrees C)

Frost-free period: 220 to 280 days

Major Land Resource Area: 40-Sonoran Basin and Range

Land Resource Unit: 40-1 Upper Sonoran Desert Shrub

Stream Segment Properties and Qualities

Active flood plain width: 5 to 500 feet

Stream flow: intermittent

Flooding hazard: frequent; brief (2 to 7 days)

Flooding month: July-September

Bank entrenchment:

percent cut: 80

percent uncut: 20

vertical cut: 1 to 30 feet; averages 3 to 10 feet

Depositional bar features: dynamic system of braided bars and channels that relocate with each major flood event; height varies with the depth and velocity of flood water.

Meander pattern: irregular meander

Channel composition:

percent cobbles: 20

percent gravel: 40

percent sand: 20

percent silt and clay: 20

Stability: dynamic system of braided components that aggrades and degrades seasonally.

Map Unit Composition

Queencreek and similar soils

Riverwash

Minor components: Agustin soils occur on higher foot slopes. Brazito soils occur on similar positions as Queencreek soils. Typic Torriorthents soils occur on higher positions.

This is an undifferentiated map unit. These components are not consistently associated geographically. At least one component is present in every delineation, but each delineation can have any combination of the components. This map unit is not consistent over time. The components of this map unit consist of a dynamic system of braided bars and channels. The active stream dynamics will cause these components to shift locations. During severe rainfall events, the channel will cut and fill throughout its length.

Soil Properties and Qualities

Queencreek soils

Taxonomic classification: Sandy-skeletal, mixed, thermic Typic Torrifluvents

Geomorphic position: generally occurs on slightly higher benches adjacent to Riverwash

Parent material: mixed stream alluvium

Slope: 0 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 5 percent

bare soil: 15 percent

rock fragments

gravel: 80 percent

cobble: 5 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 39.69 inches per hour (14.00 to 280.00 micrometers per second)

Available water capacity total inches: 2.3 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: occasional

Runoff class: very low

Hydrologic group: A

Ecological site name: Sandy Wash 10-13" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R040XA115AZ

Present vegetation: burrobush, littleleaf paloverde, whitethorn, catclaw acacia, mesquite, staghorn cholla

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: Typical pedon description is from Soil Survey of Eastern Pinal and Southern Gila Counties, Arizona; about 800 feet south and 2,500 feet west of the northeast corner of Section 33, Township 4 S, Range 14 E

Geographic Coordinate System:

33° 2' 43.00" north, 110° 55' 21.00" west

C1—0 to 7 inches (0 to 18 cm); brown (10YR 5/3) extremely gravelly sandy loam, brown (10YR 4/3), moist; 6 percent clay; single grain; loose, nonsticky and nonplastic; many very fine and fine roots; many fine pores; 60 percent gravel and 5 percent cobble; very slightly effervescent; slightly alkaline, pH 7.6; abrupt wavy boundary.

C2—7 to 17 inches (18 to 43 cm); brown (10YR 5/3) very gravelly sand, brown (10YR 4/3), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; common fine and common medium and coarse roots; many fine pores; 37 percent gravel; slightly effervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

C3—17 to 60 inches (43 to 152 cm); brown (10YR 5/3) stratified very gravelly coarse sand to very gravelly fine sand, brown (10YR 4/3), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; common fine and common coarse roots; many fine pores; 46 percent gravel; slightly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 1 to 5 percent

Rock fragments: 35 to 65 percent

Gypsum: 0 to 4 percent

Calcium carbonate equivalent: 0 to 4 percent

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

C horizons

Hue: 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Texture: coarse sand, sand, loamy sand, loamy coarse sand with thin stratifications of sandy loam, fine sandy loam, silty clay loam

Riverwash

Slope: 0 to 5 percent

Range in Characteristics

Riverwash consists of stratified sands, gravels, and cobbles from numerous sources. This material is part of a dynamic system of braided bars and channels. This material is not stable and is subject to shifting and sorting. It is usually dry but can be transformed into a temporary water course or a short-lived torrent after a heavy rain within the watershed. In very wet years, surface water can cover Riverwash for part of the year. Riverwash does not usually support vegetation because the material is constantly shifted and scoured.

60—Queencreek-Brazito-Riverwash complex, 0 to 8 percent slopes

Map Unit Setting

Landform(s): flood plains

Elevation: 2,500 to 3,800 feet (762 to 1,158 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 60 to 67 degrees F (15.6 to 19.4 degrees C)

Mean annual soil temperature: 62 to 69 degrees F (16.7 to 20.5 degrees C)

Frost-free period: 190 to 250 days

Major Land Resource Area: 41-Southeastern Arizona Basin and Range

Land Resource Unit: 41-2 Chihuahuan-Sonoran Desert Shrub Mix

Map Unit Composition

Queencreek and similar soils: 55 percent

Brazito and similar soils: 25 percent

Riverwash: 10 percent

Soil Survey of San Carlos Indian Reservation, Arizona

Minor components: Eba soils occur on higher foot slopes. Anthony and Gila soils occur on slightly higher areas.

Soil Properties and Qualities

Queencreek soils

Taxonomic classification: Sandy-skeletal, mixed, thermic Typic Torrifluvents

Geomorphic position: generally occurs on lower benches adjacent to riverwash

Parent material: mixed sandy and gravelly alluvium

Slope: 0 to 8 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 25 percent

woody debris: 2 percent

bare soil: 23 percent

rock fragments

gravel: 55 percent

Drainage class: excessively drained

Ksat solum: 19.98 to 39.69 inches per hour (141.00 to 280.00 micrometers per second)

Available water capacity total inches: 2.2 (very low)

Shrink-swell potential: about 0.5 LEP (low)

Flooding hazard: frequent

Runoff class: very low

Hydrologic group: A

Ecological site name: Sandy Wash 8-12" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R041XB213AZ

Present vegetation: mesquite, catclaw acacia, desert willow, annual grasses, perennial forbs, perennial grasses, white burrobrush

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 1,160 feet north and 290 feet west of southeast corner of Section 33, Township 5 S, Range 22 E

Geographic Coordinate System:

32° 57' 10.00" north, 110° 5' 5.00" west

AC—0 to 3 inches (0 to 8 cm); brown (10YR 5/3) very gravelly loamy coarse sand, brown (10YR 4/3), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 25 percent fine gravel and 30 percent medium gravel; noneffervescent; neutral, pH 7.2; clear wavy boundary.

C1—3 to 36 inches (8 to 91 cm); brown (10YR 5/3) stratified very gravelly loamy coarse sand, brown (10YR 4/3), moist; 3 percent clay; single grain; loose, nonsticky

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and nonplastic; many very fine and fine and few medium roots; many fine and medium pores; 25 percent fine gravel and 30 percent medium gravel; noneffervescent; slightly alkaline, pH 7.6; clear wavy boundary.

C2—36 to 60 inches (91 to 152 cm); brown (10YR 5/3) stratified very gravelly coarse sand, brown (10YR 4/3), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; few very fine, fine, and medium roots; many fine and medium pores; 25 percent fine gravel and 25 percent medium gravel; noneffervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: less than 10 percent

Rock fragments: 35 to 60 percent

Effervescence: none to strong

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

AC horizon

Hue: 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 4 dry, 2 to 3 moist

Texture: sandy loam, coarse sandy loam, loamy sand, loamy coarse sand

Rock fragments: 35 to 60 percent

C horizons

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Texture: stratified coarse sand to sandy loam

Rock fragments: 35 to 60 percent

Brazito soils

Taxonomic classification: Mixed, thermic Typic Torripsamments

Geomorphic position: generally occurs on low benches

Parent material: mixed sandy alluvium

Slope: 0 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 25 percent

woody debris: 0 percent

bare soil: 70 percent

rock fragments

gravel: 5 percent

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 39.69 inches per hour (14.00 to 280.00 micrometers per second)

Available water capacity total inches: 5.3 (moderate)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: frequent

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Runoff class: very low

Hydrologic group: A

Ecological site name: Sandy Wash 8-12" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R041XB213AZ

Present vegetation: mesquite, catclaw acacia, desert willow, annual grasses, perennial forbs, perennial grasses, white burrobrush

Land capability (irrigated): 3c

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 750 feet north and 650 feet east of southwest corner of Section 27, Township 5 S, Range 22 E

Geographic Coordinate System:

32° 57' 50.30" north, 110° 5' 2.80" west

A—0 to 0.5 inches (0 to 1 cm); brown (10YR 5/3) sand, brown (10YR 4/3), moist; 7 percent clay; moderate medium platy structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine pores; 5 percent gravel; noneffervescent; neutral, pH 7.2; clear wavy boundary.

C1—0.5 to 9 inches (1 to 23 cm); brown (10YR 5/3) sand, brown (10YR 4/3), moist; 7 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium roots; many very fine and fine pores; 2 percent gravel; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

C2—9 to 21 inches (23 to 53 cm); brown (10YR 5/3) loamy sand, brown (10YR 4/3), moist; 9 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and few medium roots; many very fine pores; 13 percent gravel; noneffervescent; slightly alkaline, pH 7.4; clear wavy boundary.

C3—21 to 35 inches (53 to 89 cm); brown (10YR 5/3) loamy fine sand, brown (10YR 4/3), moist; 9 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium roots; many very fine pores; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

C4—35 to 49 inches (89 to 124 cm); brown (10YR 5/3) very gravelly coarse sand, brown (10YR 4/3), moist; 7 percent clay; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine pores; 55 percent gravel; noneffervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

C5—49 to 60 inches (124 to 152 cm); brown (10YR 5/3) fine sandy loam, brown (10YR 4/3), moist; 11 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine pores; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: less than 10 percent

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Rock fragments: 5 to 35 percent
Effervescence: none to strong
Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

A horizon

Hue: 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 2 to 4, dry or moist
Texture: sand, loamy sand, fine sandy loam, sandy loam, coarse sandy loam
Rock fragments: 0 to 15 percent

C horizons

Hue: 10YR
Value: 4 to 5 dry, 3 to 4 moist
Chroma: 2 to 4, dry or moist
Texture: stratified coarse sand to fine sandy loam
Rock fragments: 5 to 55 percent

Riverwash

Slope: 0 to 8 percent

Range in Characteristics

Riverwash consists of stratified sands, gravels, and cobbles from numerous sources. This material is part of a dynamic system of braided bars and channels. This material is not stable and is subject to shifting and sorting. It is usually dry but can be transformed into a temporary water course or a short-lived torrent after a heavy rain within the watershed. In very wet years, surface water can cover Riverwash for part of the year. Riverwash does not usually support vegetation because the material is constantly shifted and scoured.

61—Rafters-Riverwash complex, 1 to 5 percent slopes

Map Unit Setting

Landform(s): flood plains
Elevation: 4,200 to 5,800 feet (1,280 to 1,768 meters)
Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)
Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)
Frost-free period: 160 to 210 days
Major Land Resource Area: 38-Mogollon Transition
Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Stream Segment Properties and Qualities

Active flood plain width: 50 to 1,200 feet
Stream flow: intermittent
Flooding hazard: frequent; brief (2 to 7 days)
Flood month: December-February and July-September
Water table minimum depth: greater than 60 inches
Bank entrenchment:
 percent cut: 70
 percent uncut: 30
 vertical cut: 1 to 5 feet; averages 3 to 5 feet

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Depositional bar features: dynamic system of braided bars and channels that relocate with each major flood event; height varies with the depth and velocity of flood water.

Meander pattern: irregular meander

Channel composition:

percent bedrock: 5

percent boulders: 1

percent stones: 10

percent cobbles: 15

percent gravel: 34

percent sand: 20

percent silt and clay: 15

Stability: dynamic system of braided components that aggrades and degrades seasonally.

Map Unit Composition

Rafter and similar soils: 65 percent

Riverwash: 25 percent

Minor components: Soils that have more than 35 percent clay content occur on borders of the map unit furthest from the drainageways. Lanque soils occur on higher benches.

Soil Properties and Qualities

Rafter soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Cumulic Haplustolls

Geomorphic position: generally occurs on higher benches adjacent to Riverwash

Parent material: mixed loamy alluvium derived from igneous rock

Slope: 1 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 75 percent

woody debris: 10 percent

bare soil: 0 percent

rock fragments

fine gravel: 5 percent

medium gravel: 5 percent

coarse gravel: 5 percent

cobble: 5 percent

stone: 10 percent

boulder: 5 percent

Drainage class: well drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Available water capacity total inches: 2.9 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: rare

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Runoff class: very low

Hydrologic group: A

Ecological site name: Quercus/Fallugia paradoxa-Vitis arizonica/Muhlenbergia rigens-Elymus arizonicus

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F038XB229AZ

Present vegetation: Arizona white oak, Emory oak, deergrass, Apache plume, canyon grape, gray oak, perennial grasses, perennial forbs

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,600 feet north and 1,300 feet east of southwest corner of Section 11, Township 1 S, Range 23 E

Geographic Coordinate System:

33° 21' 35.90" north, 109° 57' 38.60" west

Oi—0 to 1 inch (0 to 3 cm) slightly decomposed plant material; 1 percent clay.

Oe—1 to 2 inches (3 to 5 cm) moderately decomposed plant material; 1 percent clay.

Oa—2 to 2.5 inches (5 to 6 cm) highly decomposed plant material; 1 percent clay.

A—2.5 to 4.5 inches (6 to 11 cm); very dark grayish brown (10YR 3/2) gravelly sandy loam, very dark gray (10YR 3/1), moist; 18 percent clay; moderate fine and medium subangular blocky parting to moderate very fine and fine granular structure; soft, loose, slightly sticky and slightly plastic; many very fine and fine and common medium roots; many very fine and fine pores; 10 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 7.2; clear wavy boundary.

C1—4.5 to 12.5 inches (11 to 32 cm); dark brown (7.5YR 3/2) very gravelly sandy loam, very dark gray (7.5YR 3/1), moist; 19 percent clay; moderate medium subangular blocky parting to moderate fine and medium granular structure; soft, loose, slightly sticky and slightly plastic; many very fine, fine, and medium and common very coarse roots; many very fine and fine pores; 30 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 7.2; abrupt irregular boundary.

C2—12.5 to 62.5 inches (32 to 159 cm); brown (7.5YR 4/3) extremely cobbly sandy loam, dark brown (7.5YR 3/3), moist; 10 percent clay; moderate very fine granular structure; loose, nonsticky and nonplastic; many very fine and fine and common medium, coarse, and very coarse roots; many very fine and fine pores; 25 percent gravel and 40 percent cobble and 15 percent stone; noneffervescent; neutral, pH 7.2.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 18 percent

Rock fragments: 35 to 65 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 4 dry, 2 to 3 moist

Chroma: 2 to 3 dry, 1 to 3 moist

Texture: loam, sandy loam, fine sandy loam, loamy coarse sand
Rock fragments: 35 to 70 percent

C horizons

Hue: 7.5YR, 10YR
Value: 2.5 to 4 dry, 2 to 3 moist
Chroma: 2 to 3 dry, 1 to 3 moist
Texture: loam, sandy loam, loamy coarse sand
Rock fragments: 35 to 60 percent

Riverwash

Slope: 1 to 2 percent

Range in Characteristics

Riverwash consists of stratified sands, gravels, and cobbles from numerous sources. This material is part of a dynamic system of braided bars and channels. This material is not stable and is subject to shifting and sorting. It is usually dry but can be transformed into a temporary water course or a short-lived torrent after a heavy rain within the watershed. In very wet years, surface water can cover Riverwash for part of the year. Riverwash does not usually support vegetation because the material is constantly shifted and scoured.

62—Ripsey-Rock outcrop complex, 15 to 70 percent slopes

Map Unit Setting

Landform(s): hills
Elevation: 2,400 to 3,600 feet (732 to 1,097 meters)
Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)
Mean annual air temperature: 64 to 70 degrees F (17.8 to 21.1 degrees C)
Mean annual soil temperature: 66 to 72 degrees F (18.9 to 22.2 degrees C)
Frost-free period: 220 to 280 days
Major Land Resource Area: 40-Sonoran Basin and Range
Land Resource Unit: 40-1 Upper Sonoran Desert Shrub

Map Unit Composition

Ripsey and similar soils: 55 percent
Rock outcrop, conglomerate: 30 percent
Minor components: Stagecoach soils and Haplargids soils that have greater than 35 percent clay in the particle-size control section occur on similar positions as Ripsey soils. Queencreek soils occur in drainageways.

Soil Properties and Qualities

Ripsey soils

Taxonomic classification: Loamy, mixed, superactive, calcareous, thermic Lithic Torriorthents
Geomorphic position: generally occurs on shoulder slopes and back slopes
Parent material: slope alluvium and/or residuum weathered from conglomerate
Slope: 15 to 70 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent

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lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover: 30 percent
woody debris: 5 percent
bare soil: 10 percent
rock fragments
gravel: 60 percent
cobble: 5 percent
Depth to restrictive feature(s): 6 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.20 inches per hour (0.00 to 1.40 micrometers per second)
Available water capacity total inches: 1.2 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Conglomerate Hills 10-13" p.z.
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.
Ecological site number: R040XA128AZ
Present vegetation: whitethorn, creosotebush, black grama, threeawn, pricklypear, bush muhly, jojoba, littleleaf paloverde, ocotillo, Englemann hedgehog cactus, saguaro
Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: Typical pedon description is from Soil Survey of Eastern Pinal and Southern Gila Counties, Arizona; about 300 feet west and 1,500 feet south of the northeast corner of Section 14, Township 9 S, Range 16 E

Geographic Coordinate System:

32° 39' 24.00" north, 110° 40' 24.00" west

A—0 to 1 inch (0 to 3 cm); brown (7.5YR 5/3) sandy loam, dark brown (7.5YR 3/3), moist; 12 percent clay; weak thin platy parting to weak very fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and few medium roots; few fine pores; 10 percent gravel; slightly effervescent; slightly alkaline, pH 7.8; abrupt smooth boundary.

Bk—1 to 11 inches (3 to 28 cm); brown (7.5YR 5/3) sandy loam, dark brown (7.5YR 3/3), moist; 12 percent clay; weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine roots; few fine pores; few fine and medium carbonate masses; 10 percent gravel; strongly effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

R—11 to 60 inches (28 to 152 cm); violently effervescent; unweathered conglomerate bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 10 to 20 percent

Rock fragments: 0 to 35 percent

Effervescence: none to strong

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

A horizon

Hue: 7.5YR

Value: 5 dry, 3 to 5 moist

Chroma: 3 to 4 dry, 2 to 4 moist

Texture: sandy loam, loamy sand

Bk horizons

Hue: 7.5YR

Value: 5 to 6 dry, 3 to 5 moist

Chroma: 3 to 4, dry or moist

Texture: sandy loam, loamy sand

Cr and R horizons

Bedrock is hard conglomerate. Some pedons have thin weathered bedrock above the unweathered bedrock

Rock outcrop, conglomerate

Slope: 15 to 70 percent

Range in Characteristics

Rock outcrop consists of barren rock that occurs as ledges and near vertical cliffs of conglomerate (fanglomerate) bedrocks. Rock outcrop also includes areas where the depth to bedrock is less than four inches. The higher percentage of rock outcrop is in areas near hill tops.

63—Riverwash-Amuzet complex, 0 to 3 percent slopes

Map Unit Setting

Landform(s): flood plains

Elevation: 4,200 to 5,000 feet (1,280 to 1,524 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Riverwash: 50 percent

Amuzet and similar soils: 40 percent

Minor components: Lanque and Rafter soils occur on higher benches.

Soil Properties and Qualities

Riverwash

Slope: 0 to 3 percent

Range in Characteristics

Riverwash consists of stratified sands, gravels, and cobbles from numerous sources. This material is part of a dynamic system of braided bars and channels. This material is not stable and is subject to shifting and sorting. It is usually dry but can be transformed into a temporary water course or a short-lived torrent after a heavy rain within the watershed. In very wet years, surface water can cover Riverwash for part of the year. Riverwash does not usually support vegetation because the material is constantly shifted and scoured.

Amuzet soils

Taxonomic classification: Sandy-skeletal, mixed, thermic Aridic Ustifluvents

Geomorphic position: generally occurs on benches that are slightly higher than

Riverwash

Parent material: mixed sandy and gravelly alluvium

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

woody debris: 0 percent

bare soil: 45 percent

rock fragments

gravel: 10 percent

cobble: 10 percent

stone: 2 percent

Drainage class: excessively drained

Ksat solum: 1.98 to 39.69 inches per hour (14.00 to 280.00 micrometers per second)

Available water capacity total inches: 3.0 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: occasional

Runoff class: very low

Hydrologic group: A

Ecological site name: Sandy Bottom 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB211AZ

Present vegetation: annual grasses, perennial forbs, singlewhorl burrobush, vine mesquite, desert willow, mat muhly, sand dropseed, green sprangletop

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,300 feet north and 470 feet east of southwest corner of Section 1, Township 4 S, Range 26 E

Geographic Coordinate System:

33° 6' 45.50" north, 109° 38' 18.70" west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/3) sandy loam, dark brown (7.5YR 3/3), moist; 12 percent clay; weak thick platy structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; common very fine and fine and common medium and coarse pores; 5 percent gravel; noneffervescent; slightly alkaline, pH 7.6; clear smooth boundary.

C1—2 to 10 inches (5 to 25 cm); brown (7.5YR 5/3) stratified loam, brown (7.5YR 4/3), moist; 14 percent clay; moderate fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; common very fine and fine and common medium and coarse pores; 5 percent gravel; strongly effervescent; slightly alkaline, pH 7.8; gradual wavy boundary.

C2—10 to 60 inches (25 to 152 cm); brown (7.5YR 5/3) stratified very cobbly coarse sand, brown (7.5YR 4/3), moist; 4 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine and few medium and coarse roots; common very fine and fine and few medium and coarse pores; few carbonate coats on rock fragments; 30 percent gravel and 25 percent cobble; strongly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 1 to 8 percent

Rock fragments: 40 to 80 percent

Effervescence: none to strong

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 2 to 4 moist

Chroma: 3, dry or moist

Texture: loam, sandy loam, fine sandy loam, sand

Rock fragments: 2 to 50 percent

C horizons

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: stratified coarse sand to loam

Rock fragments: 40 to 80 percent

64—Riverwash-Brazito-Oxyaquic Torrifluvents complex, 2 to 5 percent slopes

Map Unit Setting

Landform(s): flood plains

Elevation: 2,000 to 3,600 feet (610 to 1,097 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 64 to 70 degrees F (17.8 to 21.1 degrees C)

Mean annual soil temperature: 66 to 72 degrees F (18.9 to 22.2 degrees C)

Frost-free period: 220 to 280 days

Major Land Resource Area: 40-Sonoran Basin and Range

Land Resource Unit: 40-1 Upper Sonoran Desert Shrub

Stream Segment Properties and Qualities

Segment length: lower segments of Deer Creek and Ash Creek located south of Lee Mountain flowing west to the survey boundary.
Active flood plain width: 80 to 500 feet
Stream flow: intermittent
Flooding hazard: frequent; very long (greater than or equal to 30 days)
Flood month: December-February and July-September
Water table minimum depth: 0 to 10 inches
Water table kind: apparent
Water table present: year round
Bank entrenchment:
 percent cut: 80
 percent uncut: 20
 vertical cut: 1 to 5 feet; averages 3 to 5 feet
Depositional bar features: dynamic system of braided bars and channels that relocate with each major flood event; height varies with the depth and velocity of flood water.
Meander pattern: irregular meander
Channel composition:
 percent bedrock: 10
 percent boulders: 1
 percent stones: 10
 percent cobbles: 20
 percent gravel: 29
 percent sand: 20
 percent silt and clay: 10
Stability: dynamic system of braided components that aggrades and degrades seasonally.

Map Unit Composition

Riverwash: 60 percent
Brazito and similar soils: 20 percent
Oxyaquic Torrifluvents and similar soils: 15 percent
Minor components: Queenecreek soils occur on similar positions as Brazito soils.

Soil Properties and Qualities

Riverwash

Slope: 2 to 5 percent

Range in Characteristics

Riverwash consists of stratified sands, gravels, and cobbles from numerous sources. This material is part of a dynamic system of braided bars and channels. This material is not stable and is subject to shifting and sorting. It is usually dry but can be transformed into a temporary water course or a short-lived torrent after a heavy rain within the watershed. In very wet years, surface water can cover Riverwash for part of the year. Riverwash does not usually support vegetation because the material is constantly shifted and scoured.

Brazito soils

Taxonomic classification: Mixed, thermic Typic Torripsamments

Geomorphic position: generally occurs on higher benches

Parent material: mixed sandy alluvium

Slope: 2 to 5 percent

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Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 55 percent

woody debris: 5 percent

bare soil: 33 percent

Rock fragments: 0 percent

Drainage class: well drained

Ksat solum: 5.95 to 19.98 inches per hour (42.00 to 141.00 micrometers per second)

Available water capacity total inches: 4.2 (low)

Shrink-swell potential: about 0.5 LEP (low)

Flooding hazard: frequent

Runoff class: very low

Hydrologic group: A

Ecological site name: Sandy Wash 10-13" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R040XA115AZ

Present vegetation: mesquite, catclaw acacia, desert willow, white burrobrush, desert hackberry, perennial grasses, annual grasses, perennial forbs

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 50 feet north and 800 feet east of southwest corner of Section 2, Township 5 S, Range 16 E

Geographic Coordinate System:

33° 1' 10.94" north, 110° 41' 10.76" west

A—0 to 1 inch (0 to 3 cm); brown (10YR 5/3) loamy sand, dark brown (10YR 3/3), moist; 8 percent clay; single grain; loose, nonsticky and nonplastic; common very fine roots; many very fine pores; very slightly effervescent; neutral, pH 7.2; abrupt wavy boundary.

C—1 to 60 inches (3 to 152 cm); brown (10YR 5/3) stratified loamy sand, dark brown (10YR 3/3), moist; 8 percent clay; single grain; loose, nonsticky and nonplastic; few fine roots; many very fine pores; very slightly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: less than 10 percent

Rock fragments: 0 to 15 percent

Effervescence: none to strong

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

A or AC horizon

Hue: 10YR

Value: 4 to 5 dry, 3 to 4 moist

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Chroma: 2 to 3, dry or moist
Texture: sandy loam, loamy sand
Rock fragments: 0 to 15 percent

C horizon

Hue: 10YR
Value: 4 to 5, dry or moist
Chroma: 2 to 3, dry or moist
Texture: loamy sand, loamy coarse sand
Rock fragments: 0 to 15 percent

Oxyaquic Torrifuvents soils

Taxonomic classification: Oxyaquic Torrifuvents

Geomorphic position: generally occurs on lower benches that border drainageways

Parent material: mixed sandy and gravelly alluvium

Slope: 2 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent

Chemical crust

salt: 0 percent
gypsum: 0 percent

Physical cover

canopy plant cover: 45 percent
woody debris: 0 percent
bare soil: 15 percent
rock fragments
gravel: 10 percent
cobble: 20 percent
stone: 20 percent

Depth to restrictive feature(s): 15 to 50 inches to bedrock, lithic

Drainage class: somewhat poorly drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 0.9 (very low)

Shrink-swell potential: about 1.0 LEP (low)

Flooding hazard: frequent

Seasonal water table minimum depth: about 0 to 15 inches

Runoff class: medium

Hydrologic group: D

Ecological site name: Populus fremontii-Salix gooddingii/Sporobolus wrightii

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F040XA125AZ

Present vegetation: Fremont cottonwood, Gooding willow, seepwillow baccharis, Arizona black walnut, velvet ash, mesquite, catclaw acacia, white burrobrush, broadleaf cattail, deergrass, perennial grasses

Land capability (non irrigated): 7w

Typical Profile

Location

Public Land Survey: 150 feet north and 800 feet east of southwest corner of Section 2, Township 5 S, Range 16 E

Geographic Coordinate System:

33° 1' 12.13" north, 110° 41' 10.54" west

AC—0 to 5 inches (0 to 13 cm); grayish brown (10YR 5/2) very stony sandy loam, dark grayish brown (10YR 4/2), moist; 12 percent clay; weak very fine granular parting to single grain structure; loose, nonsticky and nonplastic; many very fine and fine and common medium roots; many very fine and fine pores; 10 percent gravel and 20 percent cobble and 20 percent stone; strongly effervescent; slightly alkaline, pH 7.8; gradual wavy boundary.

C—5 to 18 inches (13 to 46 cm); grayish brown (10YR 5/2) stratified extremely stony sandy loam, dark grayish brown (10YR 4/2), moist; 10 percent clay; single grain; loose, nonsticky and nonplastic; many fine, medium, and coarse roots; many very fine and fine pores; 5 percent gravel and 30 percent cobble and 30 percent stone; strongly effervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

R—18 to 60 inches (46 to 152 cm); igneous bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 8 to 18 percent

Rock fragments: 35 to 90 percent

Effervescence: none to strong

Reaction (pH): slightly alkaline (7.4 to 7.8)

A or AC horizon

Hue: 7.5YR, 10YR

Value: 4 to 5, dry or moist

Chroma: 2 to 3, dry or moist

Texture: sandy loam, loamy sand, fine sandy loam

Rock fragments: 35 to 70 percent

C horizon

Hue: 10YR

Value: 4 to 5, dry or moist

Chroma: 2 to 3, dry or moist

Texture: sandy loam, loamy sand with strata of coarser or finer textures

Rock fragments: 50 to 90 percent

R horizon

Fractured Tertiary igneous bedrock

65—Riverwash-Ubik-Oxyaquic Torrifluvents complex, 0 to 5 percent slopes

Map Unit Setting

Landform(s): flood plains

Elevation: 2,500 to 4,500 feet (762 to 1,372 meters)

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Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)

Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)

Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)

Frost-free period: 180 to 230 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-1 Lower Interior Chaparral

Stream Segment Properties and Qualities

Active flood plain width: 50 to 1,500 feet

Stream flow: intermittent

Flooding hazard: frequent; very long (greater than or equal to 30 days)

Flood month: December-February and July-September

Water table minimum depth: 0 to 10 inches

Water table kind: apparent

Water table present: year round

Bank entrenchment:

percent cut: 80

percent uncut: 20

vertical cut: 1 to 5 feet; averages 3 to 5 feet

Depositional bar features: dynamic system of braided bars and channels that relocate with each major flood event; height varies with the depth and velocity of flood water.

Meander pattern: irregular meander

Channel composition:

percent bedrock: 10

percent boulders: 1

percent stones: 10

percent cobbles: 20

percent gravel: 29

percent sand: 20

percent silt and clay: 10

Stability: dynamic system of braided components that aggrades and degrades seasonally.

Map Unit Composition

Riverwash: 45 percent

Ubik and similar soils: 25 percent

Oxyaquic Torrifluvents and similar soils: 20 percent

Minor components: Bodecker soils occur on higher benches.

Soil Properties and Qualities

Riverwash

Slope: 0 to 5 percent

Range in Characteristics

Riverwash consists of stratified sands, gravels, and cobbles from numerous sources. This material is part of a dynamic system of braided bars and channels. This material is not stable and is subject to shifting and sorting. It is usually dry but can be transformed into a temporary water course or a short-lived torrent after a heavy rain within the watershed. In very wet years, surface water can cover Riverwash for part of the year. Riverwash does not usually support vegetation because the material is constantly shifted and scoured.

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Ubik soils

Taxonomic classification: Coarse-loamy, mixed, superactive, calcareous, thermic

Ustic Torrifluvents

Geomorphic position: generally occurs on higher benches

Parent material: mixed coarse-loamy alluvium

Slope: 0 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 90 percent

woody debris: 1 percent

bare soil: 4 percent

rock fragments

gravel: 5 percent

Drainage class: well drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Available water capacity total inches: 9.6 (high)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: frequent

Runoff class: very low

Hydrologic group: A

Ecological site name: Prosopis velutina-Prosopis glandulosa var. torreyana/

Sporobolus wrightii

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F041XC310AZ

Present vegetation: mesquite, giant sacaton, annual grasses, catclaw acacia, netleaf hackberry, Arizona black walnut, bush muhly, plains bristlegrass, threeawn, perennial forbs

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,150 feet south and 3,500 feet east of northwest corner of Section 32, Township 4 S, Range 17 E

Geographic Coordinate System:

33° 2' 43.73" north, 110° 37' 39.79" west

A—0 to 1 inch (0 to 3 cm); dark brown (10YR 3/3) loam, very dark grayish brown (10YR 3/2), moist; 15 percent clay; weak medium platy structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 2 percent fine gravel and 3 percent medium gravel; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

C1—1 to 10 inches (3 to 25 cm); brown (10YR 4/3) stratified loam, very dark grayish brown (10YR 3/2), moist; 15 percent clay; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine

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and common medium roots; many very fine and fine pores; 4 percent fine gravel and 4 percent medium gravel; slightly effervescent; slightly alkaline, pH 7.6; clear wavy boundary.

C2—10 to 28 inches (25 to 71 cm); brown (10YR 4/3) stratified loam, very dark grayish brown (10YR 3/2), moist; 15 percent clay; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium roots; many very fine and fine pores; 10 percent fine gravel; strongly effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

C3—28 to 60 inches (71 to 152 cm); brown (10YR 5/3) stratified loam, dark grayish brown (10YR 4/2), moist; 22 percent clay; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 8 percent fine gravel; violently effervescent; strongly alkaline, pH 8.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 8 to 18 percent

Rock fragments: 0 to 15 percent

A horizon

Hue: 10YR

Value: 3 to 5 dry, 3 to 4 moist

Chroma: 2 to 3 dry or moist

Texture: loam, fine sandy loam, sandy loam

Rock fragments: 0 to 10 percent

Effervescence: none to strong

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

C horizons

Hue: 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 3 dry or moist

Texture: loam, very fine sandy loam, fine sandy loam, sandy loam, with strata of coarser or finer textures

Rock fragments: 0 to 15 percent

Effervescence: slight to violent

Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 9.0)

Oxyaquic Torrifluvents soils

Taxonomic classification: Oxyaquic Torrifluvents

Geomorphic position: generally occurs on lower benches that border drainageways

Parent material: mixed sandy and gravelly alluvium

Slope: 0 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 50 percent

woody debris: 0 percent

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bare soil: 5 percent
rock fragments
gravel: 25 percent
cobble: 15 percent
stone: 20 percent

Depth to restrictive feature(s): 15 to 50 inches to bedrock, lithic

Drainage class: somewhat poorly drained

Ksat solum: 19.98 to 39.69 inches per hour (141.00 to 280.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 0.6 (very low)

Shrink-swell potential: about 0.5 LEP (low)

Flooding hazard: frequent

Seasonal water table minimum depth: about 0 to 15 inches

Runoff class: medium

Hydrologic group: D

Ecological site name: *Populus fremontii*-*Salix gooddingii*/*Muhlenbergia rigens*-*Anemopsis californica*

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F041XC317AZ

Present vegetation: Arizona sycamore, Fremont cottonwood, velvet ash, perennial grasses, Arizona black walnut, nettleleaf hackberry, Gooding willow, seepwillow baccharis, deergrass, perennial forbs

Land capability (non irrigated): 8w

Typical Profile

Location

Public Land Survey: 2,350 feet south and 1,400 feet east of northwest corner of Section 34, Township 4 S, Range 17 E

Geographic Coordinate System:

33° 2' 30.60" north, 110° 35' 55.68" west

C1—0 to 17 inches (0 to 43 cm); grayish brown (10YR 5/2) stratified extremely stony loamy coarse sand, very dark grayish brown (10YR 3/2), moist; 5 percent clay; single grain; loose, nonsticky and nonplastic; many very fine and fine and few medium roots; many very fine and fine pores; 25 percent gravel and 15 percent cobble and 35 percent stone; slightly effervescent; slightly alkaline, pH 7.8; gradual wavy boundary.

C2—17 to 24 inches (43 to 61 cm); grayish brown (10YR 5/2) stratified very stony coarse sand, very dark grayish brown (10YR 3/2), moist; 5 percent clay; single grain; loose, nonsticky and nonplastic; many very fine and fine and few medium roots; many very fine and fine pores; 30 percent gravel and 15 percent cobble and 5 percent stone; slightly effervescent; moderately alkaline, pH 8.0; abrupt wavy boundary.

R—24 to 60 inches (61 to 152 cm); igneous bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: less than 15 percent

Rock fragments: 35 to 70 percent

Effervescence: none to strong

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

C horizons

Hue: 10YR

Value: 4 or 5 dry, 3 or 4 moist

Chroma: 2 or 3 dry or moist

Texture: coarse sand, loamy coarse sand, coarse sandy loam with strata of coarser or finer textures

Rock fragments: 35 to 90 percent

R horizon

Fractured Tertiary igneous bedrock.

66—Rock outcrop and Dedal and Docdee soils, 35 to 75 percent slopes

Map Unit Setting

Landform(s): mountains

Elevation: 5,200 to 7,200 feet (1,585 to 2,195 meters)

Mean annual precipitation: 18 to 24 inches (457 to 610 millimeters)

Mean annual air temperature: 45 to 57 degrees F (7.2 to 13.9 degrees C)

Mean annual soil temperature: 47 to 59 degrees F (8.3 to 15.0 degrees C)

Frost-free period: 120 to 180 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-3 Interior Chaparral-Forests

Map Unit Composition

Rock outcrop

Dedal and similar soils

Docdee and similar soils

Minor components: Anezul soils occur on similar positions as Docdee soils. Pachic Argiustolls are more than 20 inches deep to bedrock and occur on lower back slopes and foot slopes.

This is an undifferentiated map unit. These components are not consistently associated geographically. At least one component is present in every delineation, but each delineation can have any combination of the components.

Soil Properties and Qualities

Rock outcrop

Slope: 35 to 80 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops, ledges, and cliffs of Tertiary basalt, andesite, and other volcanic and sedimentary rocks. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

Dedal soils

Taxonomic classification: Clayey-skeletal, smectitic, mesic Lithic Argiustolls

Geomorphic position: generally occurs on steep back slopes

Parent material: clayey-skeletal slope alluvium and/or residuum weathered from volcanic and sedimentary rock

Slope: 35 to 65 percent

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Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

tree canopy cover: 30 percent

plant cover: 60 percent

organic litter: 0 percent

woody debris: 0 percent

bare soil: 10 percent

rock fragments

gravel: 40 percent

cobble: 15 percent

stone: 5 percent

boulder: 1 percent

Depth to restrictive feature(s): 10 to 20 inches to bedrock, lithic; 10 to 18 inches to bedrock, paralithic

Drainage class: well drained

Ksat solum: 0.00 to 1.98 inches per hour (0.01 to 14.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 1.2 (very low)

Shrink-swell potential: about 10.5 LEP (very high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Pinus ponderosa-Quercus grisea/Bouteloua curtipendula-Poa fendleriana

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F038XC315AZ

Present vegetation: Gambel oak, alligator juniper, bullgrass, gray oak, mountain mahogany, perennial forbs, pinyon, ponderosa pine, prairie Junegrass, sacahuista, sideoats grama, sumac

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,080 feet south and 550 feet west of northeast corner of Section 11, Township 2 N, Range 25 E

Geographic Coordinate System:

33° 32' 7.20" north, 109° 42' 11.80" west

A—0 to 3 inches (0 to 8 cm); dark brown (7.5YR 3/2) cobbly loam, very dark brown (7.5YR 2.5/2), moist; 22 percent clay; weak medium subangular blocky parting to weak fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine and common medium roots; common very fine and fine and common medium pores; 10 percent gravel and 10 percent cobble; noneffervescent; neutral, pH 7.0; clear wavy boundary.

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Bt—3 to 13 inches (8 to 33 cm); brown (7.5YR 4/3) very gravelly clay, dark brown (7.5YR 3/3), moist; 48 percent clay; strong medium subangular blocky structure; very hard, firm, moderately sticky and moderately plastic; common very fine and fine and common medium roots; common very fine and fine pores; 50 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 6.8; clear wavy boundary.

Cr—13 to 15 inches (33 to 38 cm); weathered basalt bedrock; clear wavy boundary.

R—15 to 60 inches (38 to 152 cm); basalt bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 50 percent

Rock fragments: 35 to 75 percent

Effervescence: none

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 4 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: loam, clay loam, sandy clay loam

Rock fragments: 20 to 80 percent

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: clay loam, clay

Rock fragments: 30 to 60 percent

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

R horizon

Bedrock is dominantly volcanic but includes some sedimentary

Docdee soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, mesic Lithic Haplustolls

Geomorphic position: generally occurs on steep back slopes

Parent material: loamy-skeletal slope alluvium and/or residuum weathered from volcanic and sedimentary rock

Slope: 35 to 75 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

tree canopy cover: 60 percent

plant cover: 30 percent

organic litter: 50 percent

woody debris: 0 percent

bare soil: 5 percent

rock fragments

gravel: 10 percent

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cobble: 40 percent

stone: 5 percent

boulder: 2 percent

Depth to restrictive feature(s): 5 to 16 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 1.4 (very low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Pinus ponderosa-Quercus grisea/Bouteloua curtipendula-Poa fendleriana

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F038XC315AZ

Present vegetation: Gambel oak, alligator juniper, bullgrass, gray oak, mountain mahogany, perennial forbs, pinyon, ponderosa pine, prairie Junegrass, sacahuista, sideoats grama, sumac

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 550 feet south and 650 feet west of northeast corner of Section 19, Township 3 N, Range 22 E

Geographic Coordinate System:

33° 35' 42.30" north, 110° 5' 3.40" west

Oe—0 to 1 inch (0 to 3 cm) very cobbly moderately decomposed plant material; 1 percent clay; 10 percent gravel and 40 percent cobble and 5 percent stone and 1 percent boulder; clear wavy boundary.

A—1 to 3 inches (3 to 8 cm); very dark grayish brown (10YR 3/2) very cobbly loam, very dark brown (10YR 2/2), moist; 15 percent clay; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; common very fine and fine and many medium and coarse roots; many very fine and fine and common medium and coarse pores; 10 percent gravel and 40 percent cobble and 5 percent stone and 1 percent boulder; noneffervescent; neutral, pH 6.6; gradual wavy boundary.

Bw—3 to 14 inches (8 to 36 cm); dark grayish brown (10YR 4/2) very cobbly clay loam, very dark grayish brown (10YR 3/2), moist; 30 percent clay; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine and many medium and coarse and common very coarse roots; common very fine and fine and common medium and coarse pores; 20 percent gravel and 30 percent cobble and 5 percent stone and 1 percent boulder; noneffervescent; neutral, pH 6.6; clear irregular boundary.

R—14 to 60 inches (36 to 152 cm); andesite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 18 to 30 percent

Rock fragments: 30 to 60 percent
Effervescence: none
Reaction (pH): neutral (6.6 to 7.3)

A horizon

Hue: 7.5YR, 10YR
Value: 3 to 4 dry, 2 to 3 moist
Chroma: 2, dry or moist
Texture: loam
Rock fragments: 25 to 60 percent

Bw horizon

Hue: 7.5YR, 10YR
Value: 3 to 4 dry, 2.5 to 3 moist
Chroma: 2 to 3, dry or moist
Texture: clay loam, loam
Rock fragments: 30 to 60 percent

R horizon

Bedrock is hard volcanic or sedimentary

67—Rock outcrop and Ustorthents and Haplustolls soils, 40 to 80 percent slopes

Map Unit Setting

Landform(s): mountains
Elevation: 5,000 to 7,000 feet (1,524 to 2,134 meters)
Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)
Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)
Frost-free period: 160 to 210 days
Major Land Resource Area: 38-Mogollon Transition
Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Rock outcrop
Ustorthents and similar soils
Haplustolls and similar soils
Minor components: Beaumain and Limpia family soils occur in areas of andesite and basalt. Showlow soils occur in colluvium on upper shoulder slopes.

This is an undifferentiated map unit. These components are not consistently associated geographically. At least one component is present in every delineation, but each delineation can have any combination of the components.

Soil Properties and Qualities

Rock outcrop

Slope: 40 to 80 percent

Range in Characteristics

Rock outcrop consists of barren rock that occurs throughout the unit as escarpments, ledges and outcroppings of andesite, basalt, limestone, tuff, quartzite, and other igneous, metamorphic, and sedimentary rock. It also includes areas where the depth

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to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

Ustorthents soils

Taxonomic classification: Ustorthents

Geomorphic position: generally occurs on steep back slopes, mainly below the Nantac Rim

Parent material: loamy-skeletal colluvium and/or residuum weathered from igneous, metamorphic, and sedimentary rock

Slope: 40 to 80 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

plant canopy cover: 55 percent

organic litter: 30 percent

woody debris: 2 percent

bare soil: 5 percent

rock fragments

gravel: 30 percent

cobble: 20 percent

stone: 5 percent

boulder: 1 percent

Depth to restrictive feature(s): 4 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 1.3 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Clayey Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB215AZ

Present vegetation: turbinella oak, singleleaf pinyon, bullgrass, Emory oak, sideoats grama, alligator juniper, gray oak, manzanita, mountain mahogany, plains lovegrass, perennial forbs, sacahuista, shrubby buckwheat, pricklypear

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 500 feet north and 1,650 feet east of the southwest corner of Section 29, Township 3N, Range 19E

Geographic Coordinate System:

33° 34' 7.50" north, 110° 23' 18.50" west

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A—0 to 3 inches (0 to 8 cm); brown (7.5YR 4/3) very gravelly sandy loam, dark brown (7.5YR 3/2), moist; 12 percent clay; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and common medium roots; common very fine and fine pores; 40 percent gravel and 15 percent cobble and 1 percent stone; noneffervescent; slightly acid, pH 6.4; clear smooth boundary.

BC—3 to 18 inches (8 to 46 cm); brown (7.5YR 5/3) very cobbly sandy loam, brown (7.5YR 4/3), moist; 18 percent clay; weak fine and medium subangular blocky structure; slightly hard, friable, nonsticky and nonplastic; common very fine and fine and common medium and coarse roots; common very fine and fine pores; 30 percent gravel and 25 percent cobble and 1 percent stone; noneffervescent; slightly acid, pH 6.4; gradual wavy boundary.

R—18 to 60 inches (46 to 152 cm); quartzite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 15 to 35 percent

Rock fragments: 35 to 65 percent

A horizons

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 4, dry or moist

Texture: sandy loam, loam

Rock fragments: 35 to 65 percent

Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

BC or C horizons

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Texture: sandy loam, sandy clay loam, clay loam

Rock fragments: 35 to 65 percent

Effervescence: none to strong

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

R horizons

Bedrock is andesite, basalt, limestone, welded tuff, quartzite, and other igneous, metamorphic, and sedimentary rock

Haplustolls soils

Taxonomic classification: Haplustolls

Geomorphic position: generally occurs on steep back slopes, mainly below the Nantac Rim

Parent material: loamy-skeletal colluvium derived from igneous, metamorphic, and sedimentary rock

Slope: 40 to 80 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

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Physical cover

plant canopy cover: 60 percent
organic litter: 5 percent
woody debris: 1 percent
bare soil: 3 percent
rock fragments
gravel: 30 percent
cobble: 20 percent
stone: 5 percent
boulder: 1 percent

Drainage class: well drained

Ksat solum: 0.57 to 5.95 inches per hour (4.00 to 42.00 micrometers per second)

Available water capacity total inches: 2.9 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: medium

Hydrologic group: A

Ecological site name: Clayey Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB215AZ

Present vegetation: turbinella oak, singleleaf pinyon, bullgrass, Emory oak, sideoats grama, alligator juniper, gray oak, manzanita, mountain mahogany, plains lovegrass, perennial forbs, sacahuista, shrubby buckwheat, pricklypear

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,050 feet north and 2,300 feet east of the southwest corner of Section 29, Township 3N, Range 19E

Geographic Coordinate System:

33° 34' 23.10" north, 110° 23' 10.80" west

A—0 to 8 inches (0 to 20 cm); brown (7.5YR 4/2) very cobbly sandy loam, dark brown (7.5YR 3/2), moist; 18 percent clay; weak fine subangular blocky parting to weak very fine and fine granular structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine and common medium and coarse pores; 30 percent gravel and 20 percent cobble and 2 percent stone and 1 percent boulder; noneffervescent; slightly alkaline, pH 7.6; clear wavy boundary.

Bw—8 to 32 inches (20 to 81 cm); light reddish brown (5YR 6/4) extremely cobbly sandy loam, yellowish red (5YR 4/6), moist; 18 percent clay; weak fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine and common medium and coarse roots; many very fine and fine and common medium and coarse pores; 30 percent gravel and 20 percent cobble and 10 percent stone and 1 percent boulder; noneffervescent; slightly alkaline, pH 7.8; gradual wavy boundary.

C—32 to 60 inches (81 to 152 cm); light brown (7.5YR 6/3) extremely cobbly loam, brown (7.5YR 4/4), moist; 15 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine and common medium and coarse roots; many very fine and fine and common medium and coarse pores; 30 percent gravel and 30 percent cobble and 10 percent stone and 1 percent boulder; noneffervescent; neutral, pH 7.0.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 15 to 35 percent

Rock fragments: 35 to 70 percent

A horizons

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: sandy loam, loam

Rock fragments: 30 to 70 percent

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

B horizons

Hue: 5YR, 7.5YR, 10YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 3 to 6, dry or moist

Texture: sandy loam, loam, clay loam

Rock fragments: 35 to 80 percent

Calcium carbonate equivalent: 0 to 5 percent

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

BC or C horizons

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 3 to 4, dry or moist

Texture: sandy loam, sandy clay loam, loam, clay loam

Rock fragments: 10 to 40 percent

Effervescence: none to strong

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

68—Rock outcrop-Argiustolls-Haplustepts association, 40 to 80 percent slopes

Map Unit Setting

Landform(s): plateaus

Elevation: 3,400 to 6,000 feet (1,036 to 1,829 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Rock outcrop: 45 percent

Argiustolls and similar soils: 25 percent

Haplustepts and similar soils: 15 percent

Minor components: Soils that are in a sandy textural family occur on areas in close proximity to diabase bedrock. Popcorn soils occur on areas adjacent to limestone rock outcrop.

Soil Properties and Qualities

Rock outcrop

Slope: 40 to 80 percent

Range in Characteristics

Rock outcrop consists of barren rock that occurs throughout the unit as escarpments, ledges and outcroppings of diabase, limestone and other igneous, metamorphic, and sedimentary rock. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

Argiustolls soils

Taxonomic classification: Argiustolls

Geomorphic position: generally occurs on very steep escarpment slopes, mainly in the Salt River Canyon.

Parent material: mixed colluvium and/or residuum weathered from igneous, metamorphic, and sedimentary rock

Slope: 40 to 80 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 70 percent

woody debris: 0 percent

bare soil: 20 percent

rock fragments

gravel: 20 percent

cobble: 20 percent

stone: 30 percent

boulder: 2 percent

Depth to restrictive feature(s): 40 to 60 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 7.3 (high)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: C

Ecological site name: Clayey Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB215AZ

Present vegetation: singleleaf pinyon, sideoats grama, oneseed juniper, black grama, sacahuista, turbinella oak, perennial forbs, hairy grama, pointleaf manzanita, shrubby buckwheat, sotol, yucca

Soil Survey of San Carlos Indian Reservation, Arizona

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 180 feet south and 1,620 feet west of the northeast corner of Section 18, Township 4.5N, Range 18E

Geographic Coordinate System:

33° 46' 37.60" north, 110° 30' 8.00" west

A—0 to 8 inches (0 to 20 cm); brown (7.5YR 4/3) very cobbly clay loam, dark brown (7.5YR 3/3), moist; 30 percent clay; weak medium subangular blocky parting to moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; 20 percent gravel and 20 percent cobble and 10 percent stone; noneffervescent; neutral, pH 6.6; clear smooth boundary.

Bt1—8 to 12 inches (20 to 30 cm); reddish brown (5YR 4/3) very cobbly clay loam, dark reddish brown (5YR 3/3), moist; 38 percent clay; moderate coarse subangular blocky structure; moderately hard, firm, moderately sticky and moderately plastic; common very fine and fine roots; common distinct clay films on faces of peds and rock fragments; 20 percent gravel and 15 percent cobble and 3 percent stone; noneffervescent; neutral, pH 6.8; clear smooth boundary.

Bt2—12 to 30 inches (30 to 76 cm); reddish brown (5YR 5/4) clay, dark reddish brown (5YR 3/4), moist; 50 percent clay; moderate medium subangular blocky structure; very hard, very firm, very sticky and very plastic; common very fine and fine and common medium roots; few distinct clay films on faces of peds; 10 percent gravel; noneffervescent; neutral, pH 6.8; gradual wavy boundary.

BC—30 to 50 inches (76 to 127 cm); brown (7.5YR 4/4) sandy clay loam, dark brown (7.5YR 3/4), moist; 28 percent clay; weak fine subangular blocky structure; moderately hard, firm, slightly sticky and slightly plastic; common medium and coarse roots; 10 percent fine gravel; noneffervescent; neutral, pH 7.0; clear wavy boundary.

R—50 to 60 inches (127 to 152 cm); diabase bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 60 percent

Rock fragments: 15 to 50 percent

Effervescence: none

A horizons

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: loam, clay loam

Rock fragments: 20 to 70 percent

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

Upper Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 6, dry or moist

Texture: clay loam, clay

Rock fragments: 20 to 70 percent

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

Soil Survey of San Carlos Indian Reservation, Arizona

Lower Bt horizons

Hue: 5YR, 7.5YR
Value: 4 to 5 dry, 3 to 4 moist
Chroma: 4 to 6, dry or moist
Texture: clay loam, clay
Rock fragments: 10 to 40 percent
Reaction (pH): slightly acid to neutral (6.1 to 7.3)

BC or C horizons

Hue: 7.5YR, 10YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 3 to 5, dry or moist
Texture: sandy loam, sandy clay loam, loam, clay loam
Rock fragments: 10 to 40 percent
Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Cr and R horizons

Bedrock is diabase, limestone and other igneous, metamorphic, and sedimentary rock

Haplustepts soils

Taxonomic classification: Haplustepts

Geomorphic position: generally occurs on very steep escarpment slopes, mainly in the Salt River Canyon.

Parent material: mixed colluvium and/or residuum weathered from igneous, metamorphic, and sedimentary rock

Slope: 40 to 80 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent

Chemical crust

salt: 0 percent
gypsum: 0 percent

Physical cover

canopy plant cover: 60 percent
woody debris: 0 percent
bare soil: 30 percent
rock fragments
gravel: 35 percent
cobble: 15 percent
stone: 10 percent
boulder: 1 percent

Depth to restrictive feature(s): 20 to 50 inches to bedrock, paralithic; 30 to 60 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.06 to 5.95 inches per hour (0.42 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.57 inches per hour (0.00 to 4.00 micrometers per second)

Available water capacity total inches: 3.9 (low)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: very high

Soil Survey of San Carlos Indian Reservation, Arizona

Hydrologic group: D

Ecological site name: Clayey Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB215AZ

Present vegetation: singleleaf pinyon, sideoats grama, black grama, oneseed juniper, turbinella oak, hairy grama, perennial forbs, annual grasses, shrubby buckwheat, sotol, sacahuista, yucca

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,130 feet north and 1,840 feet east of the southwest corner of Section 25, Township 5N, Range 17E

Geographic Coordinate System:

33° 47' 43.10" north, 110° 29' 43.70" west

A—0 to 3 inches (0 to 8 cm); brown (7.5YR 4/4) very cobbly sandy loam, dark brown (7.5YR 3/4), moist; 16 percent clay; weak fine subangular blocky parting to weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and common medium roots; 20 percent gravel and 10 percent cobble and 5 percent stone; noneffervescent; neutral, pH 6.6; gradual wavy boundary.

Bw1—3 to 11 inches (8 to 28 cm); reddish brown (5YR 5/4) gravelly clay loam, yellowish red (5YR 4/6), moist; 36 percent clay; moderate medium subangular blocky structure; slightly hard, friable, moderately sticky and moderately plastic; common very fine and fine and common medium roots; 20 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 6.8; gradual wavy boundary.

Bw2—11 to 39 inches (28 to 99 cm); brown (7.5YR 5/4) gravelly sandy loam, brown (7.5YR 4/4), moist; 18 percent clay; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and common medium and coarse roots; 15 percent fine gravel; noneffervescent; neutral, pH 6.8; clear wavy boundary.

Cr—39 to 52 inches (99 to 132 cm); weathered diabase bedrock; clear wavy boundary.

R—52 to 60 inches (132 to 152 cm); diabase bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 20 to 35 percent

Rock fragments: 10 to 40 percent

Effervescence: none

A horizons

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 4, dry or moist

Texture: sandy loam, sandy clay loam

Rock fragments: 20 to 70 percent

Reaction (pH): slightly acid to slightly alkaline (6.1 to 7.8)

Upper B horizons

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 4 moist

Soil Survey of San Carlos Indian Reservation, Arizona

Chroma: 4 to 6, dry or moist
Texture: clay loam, sandy clay loam
Rock fragments: 15 to 70 percent
Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Lower B horizons

Hue: 7.5YR, 10YR
Value: 4 to 5 dry, 4 moist
Chroma: 4 to 5, dry or moist
Texture: sandy loam, sandy clay loam
Rock fragments: 10 to 40 percent
Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Cr and R horizons

Bedrock is diabase, limestone and other igneous, metamorphic, and sedimentary rock

69—Rock outcrop-Beaumain-Magoffin complex, 10 to 50 percent slopes

Map Unit Setting

Landform(s): hills
Elevation: 4,800 to 5,800 feet (1,463 to 1,768 meters)
Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)
Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)
Frost-free period: 160 to 210 days
Major Land Resource Area: 38-Mogollon Transition
Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Rock outcrop: 50 percent
Beaumain and similar soils: 15 percent
Magoffin and similar soils: 15 percent
Minor components: Cherrycow soils occur on lower foot slopes. Kuykendall and Budlamp soils occur throughout the unit.

Soil Properties and Qualities

Rock outcrop

Slope: 10 to 50 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops and ledges of mostly volcanic breccia. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

Beaumain soils

Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic Aridic Lithic Argiustolls

Geomorphic position: generally occurs on back slopes and foot slopes

Parent material: clayey skeletal alluvium and/or colluvium derived from volcanic breccia

Slope: 10 to 40 percent

Soil Survey of San Carlos Indian Reservation, Arizona

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 0 percent

bare soil: 10 percent

rock fragments

gravel: 45 percent

cobble: 25 percent

stone: 5 percent

Depth to restrictive feature(s): 6 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.06 to 1.98 inches per hour (0.42 to 14.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 0.9 (very low)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Clayey Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB215AZ

Present vegetation: banana yucca, blue grama, curly mesquite, hairy grama, juniper, oak, perennial forbs, pricklypear, sacahuista, sideoats grama, slender grama, sotol

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,290 feet north and 1,040 feet east of southwest corner of Section 1, Township 4 S, Range 25 E

Geographic Coordinate System:

33° 6' 36.20" north, 109° 44' 25.20" west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/3) very cobbly loam, dark brown (7.5YR 3/3), moist; 25 percent clay; weak fine and medium subangular blocky parting to weak fine granular structure; slightly hard, friable, slightly sticky and nonplastic; common very fine and fine and few medium and coarse roots; common very fine and fine and common medium and coarse pores; 20 percent gravel and 30 percent cobble; noneffervescent; neutral, pH 6.8; clear smooth boundary.

Bt—2 to 16 inches (5 to 41 cm); dark brown (7.5YR 3/3) extremely cobbly clay, very dark brown (7.5YR 2.5/3), moist; 45 percent clay; moderate fine and medium subangular blocky structure; very hard, friable, very sticky and very plastic; common very fine and fine and common medium and coarse roots; common very fine and fine and common medium and coarse pores; common distinct clay films on faces of peds

Soil Survey of San Carlos Indian Reservation, Arizona

and rock fragments; 20 percent gravel and 40 percent cobble; noneffervescent; neutral, pH 6.8; abrupt irregular boundary.

R—16 to 60 inches (41 to 152 cm); volcanic breccia bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 50 percent

Rock fragments: 35 to 60 percent

Effervescence: none

Reaction (pH): neutral (6.6 to 7.3)

A horizon

Hue: 7.5YR

Value: 3 to 4 dry, 3 moist

Chroma: 1 to 3, dry or moist

Texture: loam

Rock fragments: 35 to 50 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 dry, 2.5 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay, clay loam

Rock fragments: 35 to 60

R horizon

Bedrock is volcanic breccia

Beaumain as used in this mapping unit is a taxadjunct to the series because it has a mixed instead of smectitic mineralogy class as a result of the parent material. The Beaumain series is Clayey-skeletal, smectitic, thermic, Aridic Lithic Argiustolls.

Magoffin soils

Taxonomic classification: Loamy, mixed, superactive, thermic Aridic Lithic Haplustolls

Geomorphic position: generally occurs on summits and back slopes

Parent material: loamy slope alluvium and/or residuum weathered from volcanic breccia

Slope: 10 to 40 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 60 percent

woody debris: 0 percent

bare soil: 5 percent

rock fragments

gravel: 35 percent

cobble: 20 percent

stone: 2 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: well drained

Soil Survey of San Carlos Indian Reservation, Arizona

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 1.4 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Clayey Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB215AZ

Present vegetation: sideoats grama, annual grasses, hairy grama, honey mesquite, broom snakeweed, cane beardgrass, redberry juniper, sacahuista

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,110 feet south and 1,025 feet west of northeast corner of Section 2, Township 4 S, Range 25 E

Geographic Coordinate System:

33° 7' 4.00" north, 109° 44' 49.90" west

A1—0 to 2 inches (0 to 5 cm); very dark grayish brown (10YR 3/2) gravelly loam, very dark brown (10YR 2/2), moist; 14 percent clay; weak fine and medium subangular blocky parting to weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and common medium and coarse roots; common very fine and fine and common medium and coarse pores; 15 percent gravel; noneffervescent; neutral, pH 7.0; clear smooth boundary.

A2—2 to 12 inches (5 to 30 cm); very dark grayish brown (10YR 3/2) gravelly loam, very dark brown (10YR 2/2), moist; 18 percent clay; weak fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine and few medium and coarse roots; common very fine and fine and common medium and coarse pores; 20 percent gravel and 5 percent cobble; noneffervescent; slightly acid, pH 6.4; clear irregular boundary.

R—12 to 60 inches (30 to 152 cm); volcanic breccia bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 18 percent

Rock fragments: 15 to 25 percent

Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

A horizons

Hue: 7.5YR, 10YR

Value: 3 to 4 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: sandy loam, loam

Rock fragments: 15 to 25 percent

R horizon

Bedrock is volcanic breccia

70—Rock outcrop-Dozer complex, 20 to 60 percent slopes

Map Unit Setting

Landform(s): hills, mountains

Elevation: 2,500 to 3,600 feet (762 to 1,097 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 60 to 67 degrees F (15.6 to 19.4 degrees C)

Mean annual soil temperature: 62 to 69 degrees F (16.7 to 20.5 degrees C)

Frost-free period: 190 to 250 days

Major Land Resource Area: 41-Southeastern Arizona Basin and Range

Land Resource Unit: 41-2 Chihuahuan-Sonoran Desert Shrub Mix

Map Unit Composition

Rock outcrop: 50 percent

Dozer and similar soils: 40 percent

Minor components: Soils that are similar to Dozer, but have less than 18 percent clay or have less than 40 percent calcium carbonate equivalent.

Soil Properties and Qualities

Rock outcrop

Slope: 20 to 70 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops and ledges of Mississippian and Pennsylvanian limestone. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

Dozer soils

Taxonomic classification: Loamy-skeletal, carbonatic, thermic Lithic Torriorthents

Geomorphic position: generally occurs on back slopes

Parent material: residuum weathered from limestone

Slope: 20 to 60 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 15 percent

woody debris: 0 percent

bare soil: 15 percent

rock fragments

gravel: 60 percent

cobble: 20 percent

Depth to restrictive feature(s): 10 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.57 to 1.98 inches per hour (4.00 to 14.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.60 inches per hour (0.00 to 4.20 micrometers per second)

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Available water capacity total inches: 1.3 (very low)

Shrink-swell potential: about 2.0 LEP (low)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Limestone Hills 10-13" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R040XA107AZ

Present vegetation: annual grasses, ocotillo, pricklypear, perennial forbs, blue threeawn, bush muhly, slim tridens, saguaro, catclaw acacia, false mesquite, blue paloverde, whitethorn, creosotebush, jojoba, longleaf mormon tea, agave, yucca

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 50 feet north and 450 feet east of southwest corner of Section 25, Township 3 S, Range 18 E

Geographic Coordinate System:

33° 8' 8.80" north, 110° 27' 54.50" west

A—0 to 3 inches (0 to 8 cm); light brown (7.5YR 6/4) very cobbly loam, brown (7.5YR 4/4), moist; 22 percent clay; moderate fine and medium granular structure; hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine pores; 10 percent gravel and 40 percent cobble and 5 percent stone; violently effervescent, 40 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear smooth boundary.

BC—3 to 15 inches (8 to 38 cm); light brown (7.5YR 6/4) very cobbly loam, brown (7.5YR 4/4), moist; 18 percent clay; moderate fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine and common medium roots; many very fine and fine pores; 10 percent gravel and 40 percent cobble and 5 percent stone; violently effervescent, 44 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; clear wavy boundary.

R—15 to 60 inches (38 to 152 cm); limestone bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 18 to 25 percent

Rock fragments: 50 to 60 percent

Calcium carbonate equivalent: 35 to 50 percent

Effervescence: violent

Reaction (pH): moderately alkaline (7.9 to 8.4)

A horizon

Hue: 7.5YR

Value: 5 to 6 dry, 4 moist

Chroma: 3 to 4, dry or moist

Texture: loam, clay loam

Rock fragments: 45 to 55 percent

BC or C horizons

Hue: 7.5YR

Value: 5 to 6 dry, 4 moist
Chroma: 3 to 4, dry or moist
Texture: loam, clay loam
Rock fragments: 45 to 60 percent

R horizon
Bedrock is limestone

71—Rock outcrop-Lajitas complex, 5 to 60 percent slopes

Map Unit Setting

Landform(s): hills, mountains
Elevation: 2,000 to 3,600 feet (610 to 1,097 meters)
Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)
Mean annual air temperature: 64 to 70 degrees F (17.8 to 21.1 degrees C)
Mean annual soil temperature: 66 to 72 degrees F (18.9 to 22.2 degrees C)
Frost-free period: 220 to 280 days
Major Land Resource Area: 40-Sonoran Basin and Range
Land Resource Unit: 40-1 Upper Sonoran Desert Shrub

Map Unit Composition

Rock outcrop: 50 percent
Lajitas and similar soils: 40 percent
Minor components: Lithic Haplargids soils occur in some areas with less than 15 percent slopes. Deep soils occur on foot slopes near drainageways. Riverwash occurs in drainageways.

Soil Properties and Qualities

Rock outcrop

Slope: 5 to 60 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops and ledges of andesite or other volcanic rock. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

Lajitas soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, nonacid, thermic Lithic Torriorthents

Geomorphic position: generally occurs on back slopes

Parent material: colluvium and/or residuum weathered from andesite and/or other volcanic rock

Slope: 5 to 60 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

Soil Survey of San Carlos Indian Reservation, Arizona

woody debris: 1 percent

bare soil: 5 percent

rock fragments

gravel: 40 percent

cobble: 30 percent

stone: 10 percent

boulder: 5 percent

Depth to restrictive feature(s): 4 to 15 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.57 to 5.95 inches per hour (4.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 0.4 (very low)

Shrink-swell potential: about 2.0 LEP (low)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Volcanic Hills 10-13" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R040XA123AZ

Present vegetation: jojoba, flattop buckwheat, littleleaf paloverde, ephedra, annual grasses, brittlebush, false mesquite, ocotillo, perennial forbs, perennial grasses, pricklypear, saguaro

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 2,600 feet north and 800 feet west of southeast corner of Section 31, Township 4 S, Range 17 E

Geographic Coordinate System:

33° 2' 27.27" north, 110° 38' 33.76" west

A—0 to 1 inch (0 to 2 cm); brown (10YR 5/3) very gravelly loam, dark grayish brown (10YR 4/2), moist; 17 percent clay; moderate fine and medium subangular blocky parting to moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine pores; 40 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

AC—1 to 7 inches (2 to 18 cm); brown (10YR 5/3) extremely gravelly loam, dark grayish brown (10YR 4/2), moist; 22 percent clay; weak fine and medium subangular blocky parting to weak fine and medium granular structure; soft, very friable, slightly sticky and nonplastic; many very fine and fine and common medium roots in cracks; many very fine and fine pores; 60 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 7.2; very abrupt wavy boundary.

R—7 to 60 inches (18 to 152 cm); andesite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 7 to 27 percent

Rock fragments: 35 to 65 percent

Effervescence: none

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

A horizon

Hue: 7.5YR, 10YR
Value: 4 to 5 dry, 3 to 4 moist
Chroma: 2 to 3, dry to moist
Texture: sandy loam, loam
Rock fragments: 15 to 60 percent

AC horizons

Hue: 7.5YR, 10YR
Value: 3 to 5, dry or moist
Chroma: 2 to 4, dry or moist
Texture: sandy loam, loam
Rock fragments: 35 to 80 percent

R horizon

Bedrock is andesite or other volcanic rock

72—Rock outcrop-Lampshire complex, 15 to 50 percent slopes

Map Unit Setting

Landform(s): hills, mountains
Elevation: 2,500 to 4,500 feet (762 to 1,372 meters)
Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)
Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)
Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)
Frost-free period: 180 to 230 days
Major Land Resource Area: 41-Southeastern Arizona Basin and Range
Land Resource Unit: 41-3 Southern Arizona Semidesert Grassland

Map Unit Composition

Rock outcrop: 55 percent
Lampshire and similar soils: 40 percent
Minor components: Mabray and Pantak soils occur on similar positions as Lampshire soils. Tombstone and Ryallen soils occur on foot slopes and lower back slopes.

Soil Properties and Qualities

Rock outcrop

Slope: 15 to 50 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops and ledges of Tertiary andesite and/or tuff. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

Lampshire soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, nonacid, thermic Lithic Ustic Torriorthents

Geomorphic position: generally occurs on summits and back slopes

Parent material: colluvium and/or residuum weathered from andesite and/or tuff

Slope: 15 to 50 percent

Surface cover:

Biological crust

Soil Survey of San Carlos Indian Reservation, Arizona

cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover: 40 percent
woody debris: 0 percent
bare soil: 10 percent
rock fragments
gravel: 30 percent
cobble: 20 percent
stone: 20 percent
Depth to restrictive feature(s): 2 to 8 inches to bedrock, paralithic; 4 to 10 inches to bedrock, lithic
Drainage class: excessively drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 19.98 inches per hour (0.00 to 141.00 micrometers per second)
Available water capacity total inches: 0.4 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Volcanic Hills 12-16" p.z. Loamy
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.
Ecological site number: R041XC323AZ
Present vegetation: jojoba, flatter buckwheat, sideoats grama, annual grasses, clubmoss, desert needlegrass, false mesquite, globemallow, oneseed juniper, other ferns or fern allies, perennial grasses, pricklypear, shrubby buckwheat, slender grama
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,550 feet south and 900 feet east of northwest corner of Section 36, Township 4 S, Range 17 E

Geographic Coordinate System:

33° 2' 29.66" north, 110° 33' 59.08" west

AC—0 to 6 inches (0 to 15 cm); brown (10YR 4/3) very gravelly sandy loam, dark brown (10YR 3/3), moist; 15 percent clay; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine pores; 45 percent gravel and 10 percent cobble; noneffervescent; slightly alkaline, pH 7.5; clear irregular boundary.

Cr—6 to 8 inches (15 to 20 cm); weathered andesite bedrock.

R—8 to 60 inches (20 to 152 cm); andesite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Soil Survey of San Carlos Indian Reservation, Arizona

Clay content: 10 to 20 percent
Rock fragments: 35 to 65 percent
Effervescence: none to strong
Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 8.4)

AC horizon

Hue: 7.5YR, 10YR
Value: 4 to 5 dry, 3 to 4 moist
Chroma: 2 to 3, dry or moist
Texture: loam, sandy loam
Rock fragments: 35 to 65 percent

R horizon

Bedrock is andesite or tuff

73—Rock outcrop-Thimble-Ruidoso family complex, 15 to 65 percent slopes

Map Unit Setting

Landform(s): mountains
Elevation: 5,000 to 7,200 feet (1,524 to 2,195 meters)
Mean annual precipitation: 14 to 18 inches (356 to 457 millimeters)
Mean annual air temperature: 45 to 57 degrees F (7.2 to 13.9 degrees C)
Mean annual soil temperature: 47 to 59 degrees F (8.3 to 15.0 degrees C)
Frost-free period: 120 to 180 days
Major Land Resource Area: 38-Mogollon Transition
Land Resource Unit: 38-3 Interior Chaparral-Forests

Map Unit Composition

Rock outcrop: 40 percent
Thimble and similar soils: 35 percent
Ruidoso family and similar soils: 15 percent
Minor components: Shallow loamy soils occur on summits and back slopes.

Soil Properties and Qualities

Rock outcrop

Slope: 15 to 70 percent

Range in Characteristics

Rock outcrop consists of barren rock formed from Tertiary breccia of andesite, basalt and dacite. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

Thimble soils

Taxonomic classification: Clayey-skeletal, smectitic, mesic Aridic Lithic Argiustolls
Geomorphic position: generally occurs on summits and back slopes
Parent material: clayey alluvium and/or colluvium derived from basalt and/or volcanic breccia
Slope: 15 to 65 percent
Surface cover:
Biological crust
cyanobacteria: 0 percent
lichen: 0 percent

Soil Survey of San Carlos Indian Reservation, Arizona

moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
tree canopy: 60 percent
plant cover: 30 percent
organic litter: 15 percent
woody debris: 10 percent
bare soil: 5 percent
rock fragments
gravel: 25 percent
cobble: 40 percent
stone: 9 percent
boulder: 1 percent
Depth to restrictive feature(s): 8 to 20 inches to bedrock, lithic
Drainage class: well drained
Ksat solum: 0.06 to 1.98 inches per hour (0.42 to 14.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)
Available water capacity total inches: 0.8 (very low)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Volcanic Hills, Clayey 20-24"
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.
Ecological site number: R038XC317AZ
Present vegetation: alligator juniper, black grama, blue grama, buckbrush, gray oak, ponderosa pine, prairie Junegrass, sideoats grama, singleleaf pinyon
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,520 feet north and 350 feet west of the southeast corner of Section 25, Township 2N, Range 26E

Geographic Coordinate System:

33° 29' 13.80" north, 109° 34' 55.60" west

A—0 to 1 inch (0 to 3 cm); dark reddish gray (5YR 4/2) extremely cobbly loam, dark reddish brown (5YR 2.5/2), moist; 20 percent clay; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine pores; 20 percent gravel and 35 percent cobble and 9 percent stone and 1 percent boulder; noneffervescent; neutral, pH 6.6.

Bt—1 to 9 inches (3 to 23 cm); dark reddish gray (5YR 4/2) very cobbly clay loam, dark reddish brown (5YR 3/2), moist; 38 percent clay; moderate medium and coarse subangular blocky structure; hard, firm, moderately sticky and moderately plastic; common very fine and fine and common medium roots; common fine pores; few distinct clay films on faces of peds; 20 percent gravel and 30 percent cobble; noneffervescent; neutral, pH 6.6.

R—9 to 60 inches (23 to 152 cm); volcanic breccia bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 60 percent

Rock fragments: 35 to 75 percent

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

A horizon

Hue: 5YR, 7.5YR, 10YR

Value: 4 dry, 2.5 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: loam, clay loam

Rock fragments: 35 to 75 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 4 dry, 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay loam, clay

Rock fragments: 35 to 75 percent

Effervescence: none to slight

R horizon

Bedrock is volcanic breccia of andesite, basalt, or dacite

Ruidoso family soils

Series and series family designations are naming expedients and equal.

Taxonomic classification: Fine, mixed, superactive, mesic Pachic Argiustolls

Geomorphic position: generally occurs on lower back slopes and along drainageways

Parent material: colluvium and/or slope alluvium over residuum weathered from
volcanic breccia

Slope: 15 to 50 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

tree canopy: 50 percent

plant cover: 30 percent

organic litter: 30 percent

woody debris: 5 percent

bare soil: 5 percent

rock fragments

gravel: 20 percent

cobble: 30 percent

stone: 9 percent

boulder: 1 percent

Depth to restrictive feature(s): 30 to 60 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.06 to 1.98 inches per hour (0.42 to 14.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Soil Survey of San Carlos Indian Reservation, Arizona

Available water capacity total inches: 4.4 (low)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Volcanic Hills, Clayey 20-24"

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XC317AZ

Present vegetation: alligator juniper, bullgrass, gray oak, mountain mahogany, singleleaf pinyon

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,150 feet south and 290 feet west of the northeast corner of Section 17, Township 1N, Range 27E

Geographic Coordinate System:

33° 25' 50.30" north, 109° 32' 49.50" west

A—0 to 2 inches (0 to 5 cm); dark brown (7.5YR 3/2) very cobbly loam, very dark brown (7.5YR 2/2), moist; 18 percent clay; weak fine subangular blocky parting to moderate fine and medium granular structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine pores; 15 percent gravel and 20 percent cobble and 5 percent stone and 1 percent boulder; noneffervescent; neutral, pH 6.8; abrupt smooth boundary.

Bt1—2 to 18 inches (5 to 46 cm); dark brown (7.5YR 3/2) gravelly clay loam, very dark brown (7.5YR 2/2), moist; 33 percent clay; weak medium prismatic parting to moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine and common medium roots; common very fine and fine pores; common distinct clay films on faces of peds and rock fragments; 20 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 6.8; gradual wavy boundary.

Bt2—18 to 25 inches (46 to 64 cm); dark brown (7.5YR 3/3) clay, dark brown (7.5YR 3/3), moist; 45 percent clay; weak medium prismatic parting to moderate fine and medium subangular blocky structure; very hard, firm, moderately sticky and moderately plastic; common fine, medium, and coarse roots; common very fine and fine pores; many distinct clay films on faces of peds and rock fragments; 10 percent gravel; noneffervescent; neutral, pH 6.8; clear smooth boundary.

Bt3—25 to 32 inches (64 to 81 cm); brown (7.5YR 5/4) gravelly clay, brown (7.5YR 4/4), moist; 50 percent clay; weak medium prismatic parting to moderate fine and medium subangular blocky structure; extremely hard, firm, moderately sticky and moderately plastic; common fine, medium, and coarse roots; common very fine and fine pores; common distinct clay films on faces of peds and rock fragments; 15 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 6.8; gradual wavy boundary.

R—32 to 60 inches (81 to 152 cm); volcanic breccia bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 50 percent

Rock fragments: 15 to 35 percent

Soil Survey of San Carlos Indian Reservation, Arizona

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

A horizon

Hue: 7.5YR

Value: 3 to 4 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: loam

Rock fragments: 35 to 60 percent

Upper Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 4 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay loam, clay

Rock fragments: 15 to 35 percent

Lower Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Texture: clay

Rock fragments: 5 to 35 percent

R horizon

Bedrock is volcanic breccia of andesite, basalt, or dacite

74—Romero-Rock outcrop complex, 15 to 50 percent slopes

Map Unit Setting

Landform(s): hills

Elevation: 3,000 to 5,000 feet (914 to 1,524 meters)

Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)

Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)

Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)

Frost-free period: 180 to 230 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-1 Lower Interior Chaparral

Map Unit Composition

Romero and similar soils: 60 percent

Rock outcrop: 25 percent

Minor components: Combate soils occur in drainageways. Oracle and soils similar to Oracle that are greater than 20 inches to bedrock occur on similar positions.

Soil Properties and Qualities

Romero soils

Taxonomic classification: Loamy, mixed, superactive, nonacid, thermic, shallow Ustic Torriorthents

Geomorphic position: generally occurs on summits and back slopes

Parent material: loamy residuum and/or slope alluvium derived from diabase and/or granodiorite

Slope: 15 to 50 percent

Soil Survey of San Carlos Indian Reservation, Arizona

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 55 percent

woody debris: 0 percent

bare soil: 10 percent

rock fragments

gravel: 30 percent

cobble: 15 percent

stone: 10 percent

Depth to restrictive feature(s): 4 to 20 inches to bedrock, paralithic; 20 to 60 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 1.0 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Diabase Hills 12-16" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA135AZ

Present vegetation: annual grasses, black grama, catclaw acacia, purple threeawn, false mesquite, banana yucca, sideoats grama, red brome, pricklypear, bush muhly, perennial forbs, blue paloverde, sotol, juniper, singleleaf pinyon, broom snakeweed, turbinella oak

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,750 feet south and 1,750 feet west of the northeast corner of Section 24, Township 2 N, Range 18 E

Geographic Coordinate System:

33° 30' 14.40" north, 110° 24' 58.70" west

A1—0 to 3 inches (0 to 8 cm); brown (7.5YR 4/4) cobbly sandy loam, dark brown (7.5YR 3/4), moist; 7 percent clay; weak fine and medium subangular blocky parting to moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 10 percent gravel and 15 percent cobble and 5 percent stone; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

A2—3 to 11 inches (8 to 28 cm); dark yellowish brown (10YR 4/4) cobbly sandy loam, dark yellowish brown (10YR 3/4), moist; 8 percent clay; weak fine and medium

subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine and fine and few medium roots; many very fine and fine and few medium pores; 10 percent gravel and 15 percent cobble and 5 percent stone; noneffervescent; neutral, pH 7.2; clear irregular boundary.

Cr—11 to 30 inches (28 to 76 cm); weathered diabase bedrock; gradual broken boundary.

R—30 to 60 inches (76 to 152 cm); hard diabase bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 18 percent

Rock fragments: 5 to 40 percent

Effervescence: none

Reaction (pH): neutral (6.6 to 7.3)

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 6, dry or moist

Texture: sandy loam, coarse sandy loam

Cr horizon

Soft to hard diabase or granodiorite

R horizon

Bedrock is hard diabase or granodiorite

Romero as used in this mapping unit is a taxadjunct to the series because the particle-size class is loamy instead of a loamy-skeletal. Romero series is Loamy-skeletal, mixed, superactive, nonacid, thermic, shallow Ustic Torriorthents.

Rock outcrop

Slope: 15 to 50 percent

Range in Characteristics

Rock outcrop consists of barren rock that occurs as ledges, massive boulder piles, and nearly vertical cliffs of diabase and granodiorite. Rock outcrop also includes areas where the depth to bedrock is less than four inches.

75—Romero-Rock outcrop-Oracle complex, 20 to 70 percent slopes

Map Unit Setting

Landform(s): hills, mountains (fig. 5)

Elevation: 3,400 to 5,000 feet (1,036 to 1,524 meters)

Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)

Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)

Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)

Frost-free period: 180 to 230 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-1 Lower Interior Chaparral

Map Unit Composition

Romero and similar soils: 30 percent

Rock outcrop: 27 percent

Oracle and similar soils: 20 percent

Minor components: Eloma and soils with lithic contact occur on similar positions as Oracle and Romero soils. Combate soils occur in drainageways.

Soil Properties and Qualities

Romero soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, nonacid, thermic, shallow Ustic Torriorthents

Geomorphic position: generally occurs on shoulders and steeper back slopes

Parent material: loamy-skeletal residuum and/or slope alluvium derived from granite

Slope: 20 to 70 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust



Figure 5— This photo shows a typical area of Oracle-Romero-Combate complex, 1 to 35 percent slopes in the foreground. The steeper hills, typical of Romero-Rock outcrop-Oracle complex, 20 to 70 percent slopes, are shown in the background.

Soil Survey of San Carlos Indian Reservation, Arizona

salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover: 20 percent
woody debris: 0 percent
bare soil: 5 percent
rock fragments
gravel: 90 percent
stone: 1 percent
Depth to restrictive feature(s): 4 to 12 inches to bedrock, paralithic
Drainage class: well drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 0.7 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Granitic Hills 12-16" p.z.
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.
Ecological site number: R038XA104AZ
Present vegetation: annual forbs, turbinella oak, whitethorn acacia, sideoats grama, annual grasses, perennial forbs, banana yucca, pricklypear, bush muhly, algerita, canotia, catclaw acacia, mormon tea, skunkbush sumac, turpentine bush, buckhorn cholla
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 950 feet north and 2,550 feet west of the southeast corner of Section 35, Township 1 S, Range 16 E

Geographic Coordinate System:

33° 17' 52.50" north, 110° 40' 53.10" west

A1—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/4) very gravelly coarse sandy loam, brown (7.5YR 4/4), moist; 8 percent clay; weak thick platy parting to moderate fine and medium granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine and common medium pores; 40 percent gravel; noneffervescent; neutral, pH 7.0; clear smooth boundary.

A2—2 to 10 inches (5 to 25 cm); brown (7.5YR 5/4) very gravelly coarse sandy loam, brown (7.5YR 4/4), moist; 8 percent clay; weak fine and medium subangular blocky structure; very hard, friable, nonsticky and nonplastic; many very fine and fine and common coarse roots; many very fine and fine and common medium pores; 40 percent gravel; noneffervescent; slightly alkaline, pH 7.4; clear wavy boundary.

Cr—10 to 60 inches (25 to 152 cm); weathered granite (grus) bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Soil Survey of San Carlos Indian Reservation, Arizona

Clay content: 5 to 10 percent
Rock fragments: 35 to 70 percent
Effervescence: none
Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

A horizon

Hue: 7.5YR
Value: 5 dry, 4 moist
Chroma: 3 to 4, dry or moist
Texture: sandy loam, coarse sandy loam

Cr horizon

Bedrock is soft to hard granite or granodiorite

Rock outcrop

Slope: 20 to 70 percent

Range in Characteristics

Rock outcrop consists of barren rock that occurs as ledges, massive boulder piles, and nearly vertical cliffs of granite. Rock outcrop also includes areas where the depth to bedrock is less than four inches. The higher percentage of rock outcrop is in areas near the summit of mountains.

Oracle soils

Taxonomic classification: Loamy, mixed, superactive, thermic, shallow Ustic
Haplargids

Geomorphic position: generally occurs on summits and less sloping back slopes

Parent material: slope alluvium and/or residuum weathered from granite

Slope: 20 to 50 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent

Chemical crust

salt: 0 percent
gypsum: 0 percent

Physical cover

canopy plant cover: 15 percent
woody debris: 0 percent
bare soil: 5 percent
rock fragments
gravel: 85 percent
cobble: 5 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, paralithic

Drainage class: well drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 1.4 (very low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Granitic Hills 12-16" p.z.

Soil Survey of San Carlos Indian Reservation, Arizona

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA104AZ

Present vegetation: annual forbs, turbinella oak, whitethorn acacia, sideoats grama, annual grasses, perennial forbs, banana yucca, pricklypear, bush muhly, algerita, canotia, catclaw acacia, mormon tea, skunkbush sumac, turpentine bush, buckhorn cholla

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 500 feet north and 1,860 feet west of southeast corner of Section 35, Township 1 S, Range 16 E

Geographic Coordinate System:

33° 17' 48.00" north, 110° 40' 45.30" west

A—0 to 3 inches (0 to 8 cm); brown (7.5YR 4/4) gravelly sandy loam, dark brown (7.5YR 3/4), moist; 17 percent clay; weak fine subangular blocky parting to moderate fine and medium granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine and common medium pores; 30 percent gravel; noneffervescent; neutral, pH 7.2; clear smooth boundary.

Bt1—3 to 7 inches (8 to 18 cm); brown (7.5YR 4/4) gravelly sandy clay loam, dark brown (7.5YR 3/4), moist; 24 percent clay; moderate medium subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine and few medium pores; few faint clay films on rock fragments; 30 percent gravel; noneffervescent; neutral, pH 7.0; clear smooth boundary.

Bt2—7 to 12 inches (18 to 30 cm); brown (7.5YR 4/4) gravelly clay loam, dark brown (7.5YR 3/4), moist; 32 percent clay; moderate medium subangular blocky structure; very hard, firm, moderately sticky and moderately plastic; many very fine and fine roots; common very fine and fine and few medium pores; few faint clay films on faces of peds and rock fragments; 15 percent gravel; noneffervescent; neutral, pH 7.0; clear wavy boundary.

Cr—12 to 60 inches (30 to 152 cm); weathered granite (grus) bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 20 to 35 percent

Rock fragments: 15 to 35 percent

Effervescence: none

Reaction (pH): neutral (6.6 to 7.3)

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: sandy loam

Rock fragments: 30 to 45 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Soil Survey of San Carlos Indian Reservation, Arizona

Chroma: 3 to 4, dry or moist
Texture: sandy clay loam, clay loam
Rock fragments: 15 to 35 percent

Cr horizon

Bedrock is soft to hard granite or granodiorite

76—Showlow gravelly loam, 1 to 15 percent slopes

Map Unit Setting

Landform(s): plateaus

Elevation: 5,000 to 6,200 feet (1,524 to 1,890 meters)

Mean annual precipitation: 14 to 18 inches (356 to 457 millimeters)

Mean annual air temperature: 45 to 57 degrees F (7.2 to 13.9 degrees C)

Mean annual soil temperature: 47 to 59 degrees F (8.3 to 15.0 degrees C)

Frost-free period: 120 to 180 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-3 Interior Chaparral-Forests

Map Unit Composition

Showlow and similar soils: 90 percent

Minor components: Goldust soils occur on slightly steeper areas. Frazwell soils occur on lower drainageways.

Soil Properties and Qualities

Showlow soils

Taxonomic classification: Fine, smectitic, mesic Aridic Argiustolls

Geomorphic position: generally occurs on broad summits

Parent material: mixed alluvium and/or colluvium derived from volcanic and sedimentary rock

Slope: 1 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

tree canopy: 5 percent

plant cover: 70 percent

organic litter: 0 percent

woody debris: 0 percent

bare soil: 10 percent

rock fragments

gravel: 15 percent

cobble: 1 percent

Drainage class: well drained

Ksat solum: 0.00 to 1.98 inches per hour (0.01 to 14.00 micrometers per second)

Available water capacity total inches: 8.4 (high)

Shrink-swell potential: about 10.5 LEP (very high)

Soil Survey of San Carlos Indian Reservation, Arizona

Flooding hazard: none

Runoff class: high

Hydrologic group: D

Ecological site name: Loamy Upland 20-24" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XC307AZ

Present vegetation: blue grama, sideoats grama, hairy grama, bottlebrush squirreltail, threeawn, perennial forbs, alligator juniper, pricklypear, agave

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,400 feet north and 2,200 feet west of the southeast corner of Section 1, Township 4N, Range 17E

Geographic Coordinate System:

33° 42' 58.40" north, 110° 31' 19.60" west

A—0 to 4 inches (0 to 10 cm); brown (7.5YR 5/2) gravelly loam, brown (7.5YR 4/2), moist; 23 percent clay; moderate coarse subangular blocky parting to moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine and few medium roots; many very fine and fine and few medium pores; 15 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 6.6; clear smooth boundary.

Bt1—4 to 12 inches (10 to 30 cm); brown (7.5YR 4/3) very cobbly clay, very dark brown (7.5YR 2.5/3), moist; 45 percent clay; moderate medium subangular blocky structure; moderately hard, firm, moderately sticky and very plastic; common very fine and fine and few medium roots; common very fine and fine and few medium pores; few distinct clay films on faces of peds and rock fragments; 20 percent gravel and 30 percent cobble; noneffervescent; neutral, pH 6.6; abrupt wavy boundary.

Btss2—12 to 30 inches (30 to 76 cm); reddish brown (5YR 5/4) gravelly clay, reddish brown (5YR 4/4), moist; 55 percent clay; strong coarse prismatic parting to strong medium angular blocky structure; extremely hard, very firm, very sticky and very plastic; common very fine and fine and few medium roots; common very fine and fine and few medium pores; few distinct slickensides; common distinct pressure faces; common distinct clay films on faces of peds and rock fragments; 15 percent gravel and 2 percent cobble; noneffervescent; neutral, pH 6.8; gradual wavy boundary.

Bt3—30 to 65 inches (76 to 165 cm); reddish yellow (5YR 6/6) gravelly clay loam, yellowish red (5YR 5/6), moist; 38 percent clay; weak fine and medium subangular blocky structure; moderately hard, firm, moderately sticky and moderately plastic; few very fine, fine, and medium roots; common very fine and fine and few medium pores; few distinct clay films on faces of peds; 3 percent fine distinct iron-manganese masses; 25 percent gravel; noneffervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 60 percent

Rock fragments: 10 to 35 percent

Effervescence: none

A horizon

Hue: 7.5YR

Value: 4 to 5 dry, 3 moist

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Chroma: 2 to 3, dry or moist
Texture: loam, clay loam
Rock fragments: 10 to 35 percent
Reaction (pH): slightly acid to neutral (6.1 to 7.3)

Upper Bt horizons

Hue: 5YR, 7.5YR
Value: 4 to 5 dry, 3 to 4 moist
Chroma: 2 to 4, dry or moist
Texture: clay loam, clay
Rock fragments: 10 to 35 percent
Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Lower Bt horizons

Hue: 5YR, 7.5YR
Value: 4 to 5 dry, 3 to 4 moist
Chroma: 4 to 6, dry or moist
Texture: clay loam, sandy clay loam, clay
Rock fragments: 15 to 60 percent
Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

BC or C horizons (where present)

Hue: 5YR, 7.5YR
Value: 4 to 6 dry, 3 to 5 moist
Chroma: 3 to 6, dry or moist
Texture: sandy clay loam
Rock fragments: 15 to 60 percent
Reaction (pH): slightly to moderately alkaline (7.4 to 8.4)

77—Silverstrike family-Yarbam-Rock outcrop complex, 15 to 60 percent slopes

Map Unit Setting

Landform(s): hills, mountains
Elevation: 4,000 to 6,200 feet (1,219 to 1,890 meters)
Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)
Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)
Frost-free period: 160 to 210 days
Major Land Resource Area: 38-Mogollon Transition
Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Silverstrike family and similar soils: 40 percent
Yarbam and similar soils: 25 percent
Rock outcrop: 20 percent
Minor components: Soils that have less than 35 percent clay content and do not meet the requirements for a mollic epipedon occur throughout the unit. Soils that contain less than 35 percent rock fragments occur throughout the unit.

Soil Properties and Qualities

Silverstrike family soils

Series and series family designations are naming expedients and equal.

Soil Survey of San Carlos Indian Reservation, Arizona

Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic Aridic Haplustalfs

Geomorphic position: generally occurs on summits and back slopes

Parent material: residuum weathered from limestone and shale

Slope: 15 to 45 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 55 percent

woody debris: 5 percent

bare soil: 5 percent

rock fragments

gravel: 55 percent

cobble: 10 percent

Depth to restrictive feature(s): 16 to 27 inches to bedrock, paralithic; 20 to 29 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.60 inches per hour (0.00 to 4.20 micrometers per second)

Available water capacity total inches: 1.7 (very low)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Limestone Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB205AZ

Present vegetation: New Mexico feathergrass, buckbrush, sideoats grama, singleleaf pinyon, Fremont indigobush, whitethorn, algerita, canotia, false mesquite, juniper, perennial forbs, perennial grasses, range ratany, skunkbush sumac, sotol

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 900 feet north and 1,200 feet west of southeast corner of Section 6, Township 5 S, Range 19 E

Geographic Coordinate System:

33° 1' 20.55" north, 110° 26' 10.95" west

A—0 to 1.5 inches (0 to 4 cm); brown (7.5YR 5/3) gravelly clay loam, brown (7.5YR 4/4), moist; 35 percent clay; moderate very fine and fine granular structure; soft, very friable, moderately sticky and moderately plastic; common very fine roots; many very fine and fine pores; 30 percent gravel; violently effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

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Bt1—1.5 to 8 inches (4 to 20 cm); brown (7.5YR 5/3) gravelly clay, brown (7.5YR 4/4), moist; 40 percent clay; moderate medium and coarse subangular blocky structure; slightly hard, friable, very sticky and very plastic; many very fine and fine and common medium and coarse roots; many very fine and fine and common medium pores; many distinct clay films on faces of peds and rock fragments and few distinct clay films on surfaces along root channels; 20 percent gravel; violently effervescent; strongly alkaline, pH 8.6; clear wavy boundary.

Bt2—8 to 18 inches (20 to 46 cm); pale brown (10YR 6/3) very gravelly clay, dark yellowish brown (10YR 4/6), moist; 40 percent clay; weak very fine and fine subangular blocky structure; slightly hard, friable, very sticky and very plastic; many very fine and fine and common medium and coarse roots; many very fine and fine and common medium pores; few distinct clay films on faces of peds and rock fragments; 45 percent gravel; violently effervescent; strongly alkaline, pH 8.6; abrupt wavy boundary.

Cr—18 to 20 inches (46 to 51 cm); weathered limestone bedrock.

R—20 to 60 inches (51 to 152 cm); limestone bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 50 percent

Rock fragments: 35 to 65 percent

Calcium carbonate equivalent: 0 to 10 percent

Effervescence: strong to violent

Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 9.0)

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 2 to 3 dry, 2 to 4 moist

Texture: loam, clay, clay loam

Rock fragments: 20 to 60 percent

Effervescence: strong to violent

Bt horizons

Hue: 7.5YR, 10 YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 3 to 6, dry or moist

Texture: clay, clay loam

Rock fragments: 35 to 65 percent

R horizon

Bedrock is limestone

Yarbam soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Aridic Lithic

Haplustolls

Geomorphic position: generally occurs on summits and back slopes

Parent material: residuum weathered from limestone and shale

Slope: 15 to 60 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

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Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover: 50 percent
woody debris: 5 percent
bare soil: 0 percent
rock fragments
gravel: 50 percent
cobble: 10 percent
stone: 10 percent
boulder: 20 percent
Depth to restrictive feature(s): 6 to 20 inches to bedrock, lithic; 6 to 18 inches to bedrock, paralithic
Drainage class: well drained
Ksat solum: 0.57 to 1.98 inches per hour (4.00 to 14.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.60 inches per hour (0.00 to 4.20 micrometers per second)
Available water capacity total inches: 0.8 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Limestone Hills 16-20" p.z.
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.
Ecological site number: R038XB205AZ
Present vegetation: New Mexico feathergrass, buckbrush, sideoats grama, singleleaf pinyon, Fremont indigobush, whitethorn, algerita, canotia, false mesquite, juniper, perennial forbs, perennial grasses, range ratany, skunkbush sumac, sotol
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 900 feet north and 800 feet west of the southeast corner of Section 6, Township 5 S, Range 19 E

Geographic Coordinate System:

33° 1' 20.78" north, 110° 26' 7.21" west

A1—0 to 3 inches (0 to 8 cm); brown (7.5YR 4/3) gravelly loam, dark brown (7.5YR 3/2), moist; 22 percent clay; weak fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine pores; 15 percent gravel and 10 percent cobble; violently effervescent; moderately alkaline, pH 8.0; clear wavy boundary.

A2—3 to 8 inches (8 to 20 cm); brown (7.5YR 4/3) very cobbly loam, dark brown (7.5YR 3/2), moist; 25 percent clay; weak fine and medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine and common medium and coarse roots; many very fine and fine pores; 15 percent gravel and 40 percent cobble; violently effervescent, 45 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt wavy boundary.

Cr—8 to 10 inches (20 to 25 cm); weathered limestone bedrock.

R—10 to 60 inches (25 to 152 cm); limestone bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 18 to 27 percent

Rock fragments: 40 to 65 percent

Calcium carbonate equivalent: 10 to 50 percent

Effervescence: strong to violent

Reaction (pH): moderately alkaline to strongly alkaline (7.9 to 9.0)

A1 horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 4 dry, 2 to 3 moist

Texture: loam

Rock fragments: 20 to 60 percent

A2 horizon

Hue: 7.5YR, 10YR

Value: 5 to 8 dry, 3 to 7 moist

Chroma: 2 to 3, dry or moist

Texture: loam

Rock fragments: 40 to 65

R horizon

Bedrock is limestone

Rock outcrop

Slope: 15 to 75 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops and ledges of Mississippian and Pennsylvanian limestone. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

78—Sponiker-Bigprairie complex, 1 to 5 percent slopes

Map Unit Setting

Landform(s): fan terraces

Elevation: 5,800 to 7,200 feet (1,768 to 2,195 meters)

Mean annual precipitation: 18 to 24 inches (457 to 610 millimeters)

Mean annual air temperature: 45 to 57 degrees F (7.0 to 13.9 degrees C)

Mean annual soil temperature: 47 to 59 degrees F (8.1 to 15.0 degrees C)

Frost-free period: 120 to 180 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-3 Interior Chaparral-Forests

Map Unit Composition

Sponiker and similar soils: 60 percent

Bigprairie and similar soils: 25 percent

Minor components: Gavilan family and Broliar soils occur on slightly higher steeper areas. Frazwell family soils occur on lower drainageways.

Soil Properties and Qualities

Sponiker soils

Taxonomic classification: Fine, smectitic, mesic Pachic Argiustolls

Geomorphic position: generally occurs on linear to convex areas

Parent material: clayey alluvium derived from volcanic rock

Slope: 1 to 5 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 2 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 plant cover: 55 percent

 woody debris: 0 percent

 bare soil: 25 percent

 rock fragments

 gravel: 13 percent

 cobble: 5 percent

Drainage class: well drained

Ksat solum: 0.00 to 0.57 inches per hour (0.01 to 4.00 micrometers per second)

Available water capacity total inches: 6.4 (moderate)

Shrink-swell potential: about 10.5 LEP (very high)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Clay Loam Upland 20-24" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XC303AZ

Present vegetation: blue grama, sideoats grama, bottlebrush squirreltail, perennial forbs, prairie Junegrass, western wheatgrass, ring muhly, threeawn

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,400 feet south and 2,150 feet east of northwest corner of Section 25, Township 1 N, Range 25 E

Geographic Coordinate System:

33° 24' 14.40" north, 109° 41' 44.40" west

A—0 to 3 inches (0 to 8 cm); brown (7.5YR 4/3) gravelly clay loam, dark brown (7.5YR 3/2), moist; 35 percent clay; moderate fine and medium subangular blocky parting to moderate fine and medium granular structure; slightly hard, very friable, very sticky and very plastic; many very fine and fine roots; many very fine and fine pores; 15 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt1—3 to 12 inches (8 to 30 cm); brown (7.5YR 4/3) gravelly clay, dark brown (7.5YR 3/3), moist; 45 percent clay; strong medium and coarse subangular blocky structure;

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moderately hard, friable, very sticky and very plastic; many very fine and fine roots; many very fine and fine and common medium pores; common distinct pressure faces; many distinct clay films on faces of peds and rock fragments; 20 percent gravel and 5 percent cobble and 5 percent stone; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt2—12 to 28 inches (30 to 71 cm); brown (7.5YR 4/3) cobbly clay, dark brown (7.5YR 3/3), moist; 55 percent clay; moderate medium and coarse prismatic parting to strong medium and coarse angular blocky structure; extremely hard, extremely firm, very sticky and very plastic; many very fine and fine roots; many very fine and fine pores; common prominent pressure faces; many prominent clay films on faces of peds and rock fragments; 15 percent gravel and 10 percent cobble and 5 percent stone; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt3—28 to 60 inches (71 to 152 cm); brown (7.5YR 4/4) very cobbly clay loam, brown (7.5YR 4/4), moist; 37 percent clay; weak coarse prismatic parting to moderate medium subangular blocky structure; extremely hard, extremely firm, very sticky and very plastic; common very fine and fine roots; many very fine and fine pores; few distinct clay films on faces of peds and rock fragments; 5 percent fine prominent iron-manganese nodules; 25 percent gravel and 15 percent cobble and 10 percent stone; slightly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 60 percent

Rock fragments: 1 to 35 percent

Cracks:

Width: 0 to 1 inch

Depth: surface to 30 inches

A horizon

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: loam, clay loam

Rock fragments: 2 to 25 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Upper Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: clay loam, silty clay loam, silty clay, clay

Rock fragments: 2 to 35 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Lower Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 6, dry or moist

Texture: loam, clay loam, silty clay loam, silty clay, clay

Rock fragments: 2 to 60 percent

Effervescence: none to slight

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

Bigprairie soils

Taxonomic classification: Fine, smectitic, mesic Typic Haplusterts

Geomorphic position: generally occurs on linear to concave areas

Parent material: clayey alluvium derived from volcanic rock

Slope: 1 to 5 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 plant cover: 60 percent

 woody debris: 0 percent

 bare soil: 37 percent

 rock fragments

 gravel: 3 percent

Drainage class: well drained

Ksat solum: 0.00 to 1.98 inches per hour (0.01 to 14.00 micrometers per second)

Available water capacity total inches: 10.5 (very high)

Shrink-swell potential: about 11.5 LEP (very high)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Clayey Upland 20-24" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XC302AZ

Present vegetation: blue grama, sideoats grama, bottlebrush squirreltail, perennial forbs, prairie Junegrass, western wheatgrass, ring muhly, threeawn

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,713 feet south and 1,374 feet west of northeast corner of Section 3, Township 1 N, Range 25 E

Geographic Coordinate System:

33° 27' 40.60" north, 109° 43' 24.50" west

A—0 to 2 inches (0 to 5 cm); reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/3) moist; 55 percent clay; moderate medium platy parting to moderate fine and medium granular structure; moderately hard, friable, very sticky and very plastic; many very fine and fine roots; many very fine and fine pores; 1 percent gravel; noneffervescent; neutral, pH 7.2; abrupt smooth boundary.

Btss1—2 to 23 inches (5 to 58 cm); dark reddish gray (5YR 4/2) clay, dark reddish brown (5YR 3/2) moist; 58 percent clay; strong medium and coarse angular blocky and strong fine and medium wedge structure; extremely hard, very firm, very sticky and very plastic; common very fine and fine and few medium roots; common very fine and fine pores; many prominent slickensides; common distinct clay films on faces of peds; 1 percent gravel; noneffervescent; neutral, pH 7.2; gradual wavy boundary.

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Btss2—23 to 40 inches (58 to 102 cm); dark reddish gray (5YR 4/2) clay, dark reddish brown (5YR 3/2) moist; 60 percent clay; strong fine and medium angular blocky and strong fine and medium wedge structure; extremely hard, very firm, very sticky and very plastic; common very fine and fine and few medium roots; few very fine and fine pores; common prominent slickensides; common distinct clay films on faces of peds; 1 percent gravel; noneffervescent; slightly alkaline, pH 7.8; clear wavy boundary.

2Bt1—40 to 57 inches (102 to 145 cm); brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; 38 percent clay; weak medium prismatic parting to moderate fine and medium subangular blocky structure; hard, friable, very sticky and very plastic; few very fine and fine roots; few very fine and fine pores; common distinct clay films on faces of peds and few distinct clay films on rock fragments; few fine concretions and common medium and coarse iron-manganese masses; 10 percent gravel; noneffervescent; slightly alkaline, pH 7.8; clear wavy boundary.

2Bt2—57 to 65 inches (145 to 165 cm); brown (7.5YR 5/4) loam, dark brown (7.5YR 3/4) moist; 23 percent clay; weak coarse prismatic parting to weak fine and medium subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; few very fine and fine roots; few very fine pores; few distinct clay films on faces of peds and rock fragments; common medium iron-manganese masses; 3 percent gravel and 1 percent cobble; slightly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 60 percent

Rock fragments: 0 to 10 percent

Surface texture averages 30 percent or more clay when mixed to 7 inches

Cracks:

Width: 0.2 to 1.5 inches

Depth: surface to 30 inches or more

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 1 to 3, dry or moist

Texture: clay, clay loam

Rock fragments: 0 to 25 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Bt and Btss horizons

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: clay, silty clay, clay loam

Clay content: 30 to 60 percent

Rock fragments: 0 to 15 percent

Effervescence: none to slight

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

2Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 6 dry, 2 to 5 moist

Chroma: 3 to 6, dry or moist

Texture: clay, clay loam, sandy clay loam, loam

Clay content: 20 to 60 percent

Rock fragments: 1 to 60 percent
Effervescence: none to strong
Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

79—Stagecoach-Haplogypsids-Delnorte complex, 5 to 80 percent slopes

Map Unit Setting

Landform(s): fan terraces
Elevation: 2,000 to 3,200 feet (610 to 975 meters)
Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)
Mean annual air temperature: 64 to 70 degrees F (17.8 to 21.1 degrees C)
Mean annual soil temperature: 66 to 72 degrees F (18.9 to 22.2 degrees C)
Frost-free period: 220 to 280 days
Major Land Resource Area: 40-Sonoran Basin and Range
Land Resource Unit: 40-1 Upper Sonoran Desert Shrub

Map Unit Composition

Stagecoach and similar soils: 40 percent
Haplogypsids and similar soils: 30 percent
Delnorte and similar soils: 15 percent
Minor components: Topawa soils occur on wider summits. Nahda and Rillino soils occur on similar positions as Delnorte soils. Whitecliff soils and Haplogypsids soils that have greater than 9.0 pH, greater than 35 percent clay with vertic properties, or less than 18 percent clay in the particle-size control section occur on similar positions as Haplogypsids soils. Soils that have consolidated (diatomite, calcareous and gypsiferous sedimentary bedrock) and nonconsolidated (lacustrine sediments) materials and Badlands occur throughout the map unit. Queencreek soils and Riverwash occur in drainageways.

Soil Properties and Qualities

Stagecoach soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Typic Haplocalcids

Geomorphic position: generally on summits and back slopes

Parent material: mixed fan alluvium

Slope: 5 to 45 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 20 percent

woody debris: 5 percent

bare soil: 25 percent

rock fragments

gravel: 40 percent

cobble: 10 percent

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Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Available water capacity total inches: 3.6 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: A

Ecological site name: Limy Upland 10-13" p.z. Deep

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R040XA106AZ

Present vegetation: Christmas cactus, annual grasses, catclaw acacia, creosotebush, littleleaf paloverde, mesquite, pricklypear, saguaro

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: Typical pedon description is from Soil Survey of Eastern Pinal and Southern Gila Counties, Arizona; about 2,000 feet south and 300 feet east of the northwest corner of Section 17, Township 8 S, Range 17 E

Geographic Coordinate System:

32° 44' 20.00" north, 110° 38' 12.00" west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/3) gravelly fine sandy loam, dark brown (7.5YR 3/4), moist; 7 percent clay; weak thin platy structure; soft, very friable, nonsticky and nonplastic; many very fine roots; common fine pores; 30 percent gravel; violently effervescent, 1 percent calcium carbonate equivalent; slightly alkaline, pH 7.8; abrupt smooth boundary.

Bk1—2 to 38 inches (5 to 97 cm); light brown (7.5YR 6/3) very gravelly sandy loam, brown (7.5YR 4/3), moist; 10 percent clay; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common fine and few medium roots; few fine pores; many continuous distinct carbonate coats on rock fragments; many fine and medium carbonate masses; 45 percent gravel; violently effervescent, 13 percent calcium carbonate equivalent; moderately alkaline, pH 8.0; clear smooth boundary.

Bk2—38 to 60 inches (97 to 152 cm); light brown (7.5YR 6/3) very gravelly loamy sand, brown (7.5YR 4/3), moist; 5 percent clay; massive; soft, very friable, nonsticky and nonplastic; few fine and medium roots; few fine pores; many continuous distinct carbonate coats on rock fragments; 45 percent gravel and 10 percent cobble; violently effervescent, 9 percent calcium carbonate equivalent; moderately alkaline, pH 8.0; abrupt smooth boundary.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 20 percent

Rock fragments: 35 to 60 percent

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

A horizon

Hue: 10YR, 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Soil Survey of San Carlos Indian Reservation, Arizona

Texture: sandy loam, loamy sand, fine sandy loam
Calcium carbonate equivalent: 0 to 5 percent

Bk horizons

Hue: 10YR, 7.5YR
Value: 5 to 7 dry, 3 to 5 moist
Chroma: 3 to 4, dry or moist
Texture: sandy loam, loamy sand
gypsum: 0 to 5 percent
Calcium carbonate equivalent: 5 to 25 percent

These soils occur over consolidated (diatomite and calcareous and gypsiferous sedimentary bedrock) and nonconsolidated (lacustrine sediments) materials

Haplogypsis soils

Taxonomic classification: Haplogypsis

Geomorphic position: generally occurs on eroded surfaces of back slopes

Parent material: gypsiferous and calcareous lacustrine deposits

Slope: 20 to 80 percent

Surface cover:

Biological crust
 cyanobacteria: 30 percent
 lichen: 0 percent
 moss: 0 percent
Chemical crust
 salt: 0 percent
 gypsum: 10 percent(crystals)
Physical cover
 canopy plant cover: 25 percent
 woody debris: 5 percent
 bare soil: 10 percent
 rock fragments
 gravel: 20 percent
 cobble: 5 percent

Depth to restrictive feature(s): 30 to 48 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 4.6 (low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: A

Ecological site name: Gypsum Upland 10-13" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R040XA126AZ

Present vegetation: Englemann hedgehog cactus, whitethorn, annual grasses, catclaw acacia, creosotebush, littleleaf paloverde, mesquite, mormon tea, ocotillo, pricklypear

Land capability (non irrigated): 8

Typical Profile

Location

Public Land Survey: Typical pedon description is from Soil Survey of Eastern Pinal and Southern Gila Counties, Arizona; about 1,400 feet south and 1,200 feet east of the northwest corner of Section 17, Township 8 S, Range 17 E

Geographic Coordinate System:

32° 44' 34.00" north, 110° 37' 50.00" west

Bky1—0 to 2 inches (0 to 5 cm); light gray (10YR 7/2) gypsiferous loam, light yellowish brown (10YR 6/4), moist; 10 percent clay; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; many fine pores; many fine and medium gypsum crystals; noneffervescent, 38 percent gypsum; slightly alkaline, pH 7.6; abrupt smooth boundary.

Bky2—2 to 18 inches (5 to 46 cm); very pale brown (10YR 7/3) gypsiferous sandy loam, yellowish brown (10YR 5/4), moist; 5 percent clay; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; many fine pores; many fine carbonate masses and many fine gypsum masses and many fine and medium gypsum crystals; strongly effervescent, 33 percent gypsum; slightly alkaline, pH 7.6; abrupt smooth boundary.

Bky3—18 to 26 inches (46 to 66 cm); pale brown (10YR 6/3) gypsiferous loam, dark yellowish brown (10YR 4/4), moist; 8 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; few fine pores; few very fine carbonate masses and few very fine gypsum masses and many very fine gypsum crystals; strongly effervescent, 1 percent calcium carbonate equivalent and 38 percent gypsum; slightly alkaline, pH 7.8; clear smooth boundary.

Bky4—26 to 42 inches (66 to 107 cm); brown (10YR 5/3) gypsiferous loam, dark yellowish brown (10YR 4/4), moist; 18 percent clay; strong medium platy parting to strong thin platy structure; slightly hard, very friable, nonsticky and slightly plastic; few very fine roots; few fine pores; many very fine gypsum crystals; violently effervescent, 10 percent calcium carbonate equivalent and 33 percent gypsum; moderately alkaline, pH 8.0; abrupt smooth boundary.

R—42 to 48 inches (107 to 122 cm); extremely hard; strongly effervescent, 75 percent gypsum; unweathered consolidated gypsum and gypsum crystals bedrock; abrupt smooth boundary.

Cky—48 to 60 inches (122 to 152 cm); brown (10YR 5/3) gypsiferous clay loam, dark yellowish brown (10YR 4/4), moist; 32 percent clay; massive; soft, very friable, very sticky and very plastic; few fine pores; many fine and medium gypsum crystals; violently effervescent, 8 percent calcium carbonate equivalent and 33 percent gypsum; slightly alkaline, pH 7.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 35 percent

Rock fragments: 0 to 10 percent

Gypsum: 15 to 50 percent

Calcium carbonate equivalent: 0 to 20 percent

Reaction (pH): slightly to moderately alkaline (7.4 to 8.4)

Bky and Cky horizons

Hue: 10YR, 7.5YR

Value: 5 to 7 dry, 3 to 6 moist

Chroma: 2 to 4, dry or moist

Soil Survey of San Carlos Indian Reservation, Arizona

Texture: sandy loam, loam, fine sandy loam, clay loam, silty clay loam, clay, silt loam, very fine sandy loam

Rock fragments: may contain up to 60 percent gypsum crystals and consolidated gypsum fragments

R horizon

Bedrock is consolidated calcareous and gypsiferous sedimentary rock interbedded with nonconsolidated (lacustrine sediments) materials. Can be cemented with gypsum, calcium carbonate, and/or silica. Bedrock is not present in all pedons within 60 inches.

Delnorte soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic, shallow Calcic Petrocalcids

Geomorphic position: generally occurs on summits and shoulder slopes

Parent material: mixed fan alluvium

Slope: 5 to 10 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 20 percent

woody debris: 5 percent

bare soil: 10 percent

rock fragments

gravel: 70 percent

cobble: 20 percent

Depth to restrictive feature(s): 6 to 20 inches to petrocalcic; 20 to 45 inches to strongly contrasting textural stratification

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 1.2 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: high

Hydrologic group: D

Ecological site name: Limy Upland 10-13" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R040XA111AZ

Present vegetation: annual grasses, catclaw acacia, creosotebush, littleleaf paloverde, mormon tea, ocotillo, pricklypear, saguaro

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: Typical pedon description is from Soil Survey of Eastern Pinal

Soil Survey of San Carlos Indian Reservation, Arizona

and Southern Gila Counties, Arizona; about 1,000 feet south and 1,900 feet east of the northwest corner of Section 17, Township 8 S, Range 17 E

Geographic Coordinate System:

32° 44' 30.00" north, 110° 37' 54.00" west

A—0 to 1 inch (0 to 3 cm); yellowish brown (10YR 5/4) gravelly sandy loam, dark yellowish brown (10YR 3/4), moist; 10 percent clay; weak thin platy structure; soft, very friable, nonsticky and nonplastic; common very fine roots; common fine pores; 25 percent gravel; strongly effervescent, 1 percent calcium carbonate equivalent; slightly alkaline, pH 7.8; abrupt smooth boundary.

Bk1—1 to 8 inches (3 to 20 cm); yellowish brown (10YR 5/4) very gravelly loam, dark yellowish brown (10YR 4/4), moist; 15 percent clay; weak fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots; common fine pores; many continuous distinct carbonate coats on rock fragments; many very fine carbonate masses; 45 percent gravel; violently effervescent, 12 percent calcium carbonate equivalent; slightly alkaline, pH 7.8; clear smooth boundary.

Bk2—8 to 13 inches (20 to 33 cm); pale brown (10YR 6/3) very gravelly loam, yellowish brown (10YR 5/4), moist; 15 percent clay; massive; slightly hard, friable, nonsticky and slightly plastic; common very fine roots; few fine pores; many continuous distinct carbonate coats on rock fragments; 40 percent gravel; violently effervescent, 21 percent calcium carbonate equivalent; moderately alkaline, pH 8.0; abrupt smooth boundary.

Bkm—13 to 38 inches (33 to 97 cm); very hard; violently effervescent; cemented material, petrocalcic; abrupt smooth boundary.

Bk3—38 to 60 inches (97 to 152 cm); pale brown (10YR 6/3) very gravelly loamy sand, yellowish brown (10YR 5/4), moist; 3 percent clay; massive; soft, very friable, nonsticky and nonplastic; few fine pores; many continuous distinct carbonate coats on rock fragments; many fine carbonate masses; 40 percent gravel; violently effervescent, 22 percent calcium carbonate equivalent and 2 percent gypsum; moderately alkaline, pH 8.0; abrupt smooth boundary.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 25 percent

Rock fragments: 35 to 50 percent

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

A horizon

Hue: 10YR, 7.5YR

Value: 5 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Texture: sandy loam, loamy sand, loam

Calcium carbonate equivalent: 0 to 5 percent

Bk horizons

Hue: 10YR, 7.5YR

Value: 5 to 6 dry, 4 to 5 moist

Chroma: 3 to 4, dry or moist

Texture: sandy loam, loam, loamy sand

Gypsum: 0 to 4 percent

Calcium carbonate equivalent: 5 to 30 percent

Bkm horizon

Continuous, indurated calcium carbonate, 1 to 6 feet thick

These soils occur over consolidated (diatomite and calcareous and gypsiferous sedimentary bedrock) and nonconsolidated (lacustrine sediments) materials

80—Terrarossa-Blacktail complex, 5 to 60 percent slopes

Map Unit Setting

Landform(s): fan terraces

Elevation: 4,000 to 5,000 feet (1,219 to 1,524 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Terrarossa and similar soils: 65 percent

Blacktail and similar soils: 35 percent

Minor components: Soils that meet the requirements for a mollic epipedon occur on similar positions as Terrarossa soils. Rock outcrop occurs on steeper back slopes.

Soil Properties and Qualities

Terrarossa soils

Taxonomic classification: Fine, mixed, superactive, thermic Aridic Paleustalfs

Geomorphic position: generally occurs on summits and upper back slopes

Parent material: mixed fan alluvium

Slope: 5 to 45 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 35 percent

woody debris: 5 percent

bare soil: 5 percent

rock fragments

gravel: 45 percent

cobble: 10 percent

Drainage class: well drained

Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)

Available water capacity total inches: 0.4 (very low)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Soil Survey of San Carlos Indian Reservation, Arizona

Runoff class: high

Hydrologic group: C

Ecological site name: Loamy Slopes 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB208AZ

Present vegetation: curly mesquite, vine mesquite, sideoats grama, gray oak, mimosa, turbinella oak, banana yucca, singleleaf pinyon

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: Typical pedon description is from Soil Survey of Eastern Pinal and Southern Gila Counties, Arizona; about 2,150 feet east and 200 feet south of the northwest corner of Section 25, Township 2 S, Range 15 E

Geographic Coordinate System:

33° 14' 8.70" north, 110° 45' 59.80" west

A—0 to 2 inches (0 to 5 cm); dark brown (7.5YR 3/4) clay loam, dark brown (7.5YR 3/2), moist; 35 percent clay; moderate fine subangular blocky parting to moderate fine granular structure; soft, very friable, moderately sticky and moderately plastic; many very fine roots; many very fine pores; 5 percent gravel; noneffervescent; neutral, pH 7.0; abrupt smooth boundary.

Bt1—2 to 22 inches (5 to 56 cm); reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4), moist; 60 percent clay; strong medium angular blocky structure; extremely hard, extremely firm, very sticky and very plastic; many very fine and fine roots; many very fine pores; many continuous distinct clay films on faces of peds; noneffervescent; neutral, pH 7.0; clear smooth boundary.

Bt2—22 to 35 inches (56 to 89 cm); yellowish red (5YR 4/6) clay, dark reddish brown (5YR 3/3), moist; 45 percent clay; strong medium angular blocky structure; extremely hard, extremely firm, very sticky and very plastic; few very fine roots; many very fine pores; many continuous distinct clay films on faces of peds; noneffervescent; neutral, pH 7.0; clear smooth boundary.

Bt3—35 to 60 inches (89 to 152 cm); yellowish red (5YR 5/6) clay, yellowish red (5YR 4/6), moist; 42 percent clay; strong medium angular blocky structure; extremely hard, extremely firm, very sticky and very plastic; few fine roots; many very fine pores; many continuous distinct clay films on faces of peds and rock fragments; 5 percent gravel; noneffervescent; neutral, pH 7.0.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 40 to 60 percent

Rock fragments: 10 to 35 percent

Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

A horizon

Hue: 7.5YR, 5YR

Value: 3 to 4, dry or moist

Chroma: 3 to 4 dry, 2 to 3 moist

Texture: loam, clay loam

Soil Survey of San Carlos Indian Reservation, Arizona

Bt horizons

Hue: 2.5YR, 5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 6, dry or moist

Texture: clay

Blacktail soils

Taxonomic classification: Fine, mixed, superactive, thermic Calcic Argiustolls

Geomorphic position: generally occurs on back slopes

Parent material: mixed fan alluvium

Slope: 10 to 60 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 35 percent

woody debris: 5 percent

bare soil: 5 percent

rock fragments

gravel: 45 percent

cobble: 10 percent

Drainage class: well drained

Ksat solum: 0.06 to 1.98 inches per hour (0.42 to 14.00 micrometers per second)

Available water capacity total inches: 8.0 (high)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: C

Ecological site name: Loamy Slopes 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB208AZ

Present vegetation: curly mesquite, pricklypear, banana yucca, mimosa, sideoats grama

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: Typical pedon description is from Soil Survey of Eastern Pinal and Southern Gila Counties, Arizona; about 2,650 feet east and 550 feet south of the northwest corner of Section 25, Township 2 S, Range 15 E

Geographic Coordinate System:

33° 14' 11.00" north, 110° 46' 11.10" west

A—0 to 2 inches (0 to 5 cm); dark brown (7.5YR 3/3) clay loam, very dark brown (7.5YR 2.5/3), moist; 38 percent clay; moderate fine subangular blocky parting to moderate fine granular structure; soft, very friable, moderately sticky and very plastic;

Soil Survey of San Carlos Indian Reservation, Arizona

many very fine roots; many very fine pores; 5 percent gravel; noneffervescent; neutral, pH 7.0; abrupt smooth boundary.

Bt—2 to 24 inches (5 to 61 cm); dark reddish brown (5YR 3/3) clay, dark reddish brown (5YR 3/3), moist; 60 percent clay; strong medium angular blocky structure; extremely hard, extremely firm, very sticky and very plastic; few very fine and common medium roots; many very fine pores; many continuous distinct clay films on faces of peds; noneffervescent; neutral, pH 7.0; abrupt wavy boundary.

Bk—24 to 60 inches (61 to 152 cm); pink (7.5YR 7/3) gravelly loam, light brown (7.5YR 6/4), moist; 25 percent clay; massive; soft, friable, slightly sticky and moderately plastic; few fine roots; many very fine and fine pores; many continuous distinct carbonate coats on faces of peds and rock fragments; 25 percent gravel and 5 percent cobble; violently effervescent, 42 percent calcium carbonate equivalent; moderately alkaline, pH 8.4.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 60 percent

Rock fragments: 5 to 35 percent

A horizon

Hue: 7.5YR

Value: 3 to 4 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: loam, clay loam

Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

Bt horizons

Hue: 7.5YR, 5YR

Value: 3 to 4 dry, 2 to 3 moist

Chroma: 2 to 4, dry or moist

Texture: clay, clay loam

Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

Bk horizons

Hue: 7.5YR, 10YR

Value: 5 to 7, dry or moist

Chroma: 3 to 4, dry or moist

Texture: loam, sandy loam

Calcium carbonate equivalent: 30 to 45 percent

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

81—Terrarossa-Cloverdale-Blacktail complex, 1 to 35 percent slopes

Map Unit Setting

Landform(s): fan terraces

Elevation: 4,200 to 5,800 feet (1,280 to 1,768 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Frost-free period: 160 to 210 days

Soil Survey of San Carlos Indian Reservation, Arizona

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Terrarossa and similar soils: 45 percent

Cloverdale and similar soils: 40 percent

Blacktail and similar soils: 10 percent

Minor components: Kuykendall and Woodcutter soils occur on higher fan terrace positions. Ustifluvents soils and Riverwash occur along drainageways.

Soil Properties and Qualities

Terrarossa soils

Taxonomic classification: Fine-loamy, mixed, superactive, thermic Aridic Argiustolls

Geomorphic position: generally occur on summits and less sloping back slopes

Parent material: alluvium from mixed igneous and sedimentary sources

Slope: 1 to 15 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 20 percent

 woody debris: 0 percent

 bare soil: 55 percent

 rock fragments

 fine gravel: 15 percent

 medium gravel: 5 percent

 coarse gravel: 5 percent

Drainage class: well drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Available water capacity total inches: 9.2 (high)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: low

Hydrologic group: C

Ecological site name: Loamy Upland 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB209AZ

Present vegetation: blue grama, prairie junegrass, sideoats grama, black grama, shrubby buckwheat, annual grasses, bottlebrush squirreltail, curly mesquite, perennial forbs, perennial grasses, tobosa

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,400 feet north and 650 feet east of southwest corner of Section 29, Township 2 S, Range 25 E

Soil Survey of San Carlos Indian Reservation, Arizona

Geographic Coordinate System:

33° 13' 33.02" north, 109° 48' 39.45" west

A1—0 to 1 inch (0 to 3 cm); brown (7.5YR 4/3) gravelly sandy loam, dark brown (7.5YR 3/3), moist; 9 percent clay; weak fine and medium subangular blocky parting to strong very fine granular structure; soft, very friable, moderately sticky and slightly plastic; many very fine roots; many very fine pores; 20 percent gravel; noneffervescent; neutral, pH 7.2; clear wavy boundary.

A2—1 to 8 inches (3 to 20 cm); brown (7.5YR 4/3) gravelly loam, dark brown (7.5YR 3/3), moist; 17 percent clay; weak fine and medium subangular blocky parting to strong very fine granular structure; soft, very friable, moderately sticky and slightly plastic; many very fine roots; many very fine pores; 15 percent gravel; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

Bt1—8 to 21 inches (20 to 53 cm); dark reddish brown (5YR 3/3) loam, dark reddish brown (5YR 3/2), moist; 25 percent clay; moderate medium and coarse subangular blocky structure; hard, firm, very sticky and very plastic; many very fine roots; many very fine pores; common distinct clay films on faces of peds and rock fragments and few distinct clay bridges between sand grains; 10 percent gravel; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt2—21 to 36 inches (53 to 91 cm); dark reddish brown (5YR 3/3) gravelly sandy clay loam, dark reddish brown (5YR 3/3), moist; 27 percent clay; weak medium and coarse subangular blocky structure; very hard, very firm, very sticky and very plastic; common very fine and fine roots; many very fine pores; many distinct clay films on faces of peds and rock fragments and common distinct clay bridges between sand grains; 25 percent gravel and 5 percent cobble; noneffervescent; slightly alkaline, pH 7.4; abrupt wavy boundary.

2Bt—36 to 49 inches (91 to 124 cm); brown (7.5YR 5/4) silty clay loam, reddish brown (5YR 4/4), moist; 31 percent clay; weak medium prismatic structure; hard, friable, very sticky and very plastic; few very fine and fine roots between peds; many very fine pores; many distinct clay films on faces of peds; 5 percent medium iron-manganese nodules; noneffervescent; slightly alkaline, pH 7.8; gradual wavy boundary.

2Btk—49 to 60 inches (124 to 152 cm); brown (7.5YR 5/4) silty clay loam, reddish brown (5YR 4/4), moist; 34 percent clay; weak medium prismatic structure; hard, friable, very sticky and very plastic; few very fine and fine roots between peds; many very fine pores; many distinct clay films on faces of peds; 5 percent medium iron-manganese nodules; common medium carbonate masses; slightly effervescent; strongly alkaline, pH 8.6.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 18 to 35 percent

Rock fragments: 0 to 35 percent

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 2 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: loam

Rock fragments: 0 to 30 percent

Effervescence: none

Reaction (pH): neutral (6.6 to 7.3)

Soil Survey of San Carlos Indian Reservation, Arizona

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2.5 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: clay, clay loam, silty clay loam

Rock fragments: 0 to 35 percent

Effervescence: none to strong

Reaction (pH): neutral to strongly alkaline (6.6 to 9.0)

Terrarosa as used in this mapping unit is a taxadjunct to the series because it meets the color and/or depth requirements for a mollic epipedon and the particle-size class is fine-loamy instead of fine. Terrarosa series is Fine, mixed, superactive, thermic Aridic Paleustalfs.

Cloverdale soils

Taxonomic classification: Fine, smectitic, thermic Torrtic Argiustolls

Geomorphic position: generally occur on summits and foot slopes

Parent material: clayey alluvium derived from volcanic rock

Slope: 1 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 10 percent

woody debris: 0 percent

bare soil: 65 percent

rock fragments

fine gravel: 8 percent

medium gravel: 7 percent

coarse gravel: 5 percent

cobble: 4 percent

stone: 1 percent

Drainage class: well drained

Ksat solum: 0.00 to 1.98 inches per hour (0.01 to 14.00 micrometers per second)

Available water capacity total inches: 10.1 (very high)

Shrink-swell potential: about 10.0 LEP (very high)

Flooding hazard: none

Runoff class: medium

Hydrologic group: D

Ecological site name: Clayey Upland 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB202AZ

Present vegetation: tobosa, prairie junegrass, annual grasses, blue grama, bottlebrush squirreltail, curly mesquite, perennial forbs, sideoats grama, vine mesquite

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,250 feet north and 700 feet east of southwest corner of Section 29, Township 2 S, Range 25 E

Geographic Coordinate System:

33° 13' 33.10" north, 109° 48' 39.62" west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/3) clay loam, dark brown (7.5YR 3/3), moist; 30 percent clay; moderate thin platy parting to strong very fine granular structure; soft, loose, very sticky and very plastic; common very fine roots; many very fine pores; 10 percent gravel; noneffervescent; neutral, pH 7.0; abrupt wavy boundary.

Bt1—2 to 5 inches (5 to 13 cm); brown (7.5YR 4/3) clay, dark brown (7.5YR 3/3), moist; 40 percent clay; moderate medium and coarse subangular blocky structure; very hard, very firm, very sticky and very plastic; many very fine and few medium roots; common very fine pores; common distinct clay films on faces of peds; 5 percent gravel; noneffervescent; neutral, pH 7.0; clear wavy boundary.

Bt2—5 to 23 inches (13 to 58 cm); reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/3), moist; 46 percent clay; moderate medium wedge and moderate coarse subangular blocky structure; very hard, very firm, very sticky and very plastic; common very fine and few medium and coarse roots; common very fine pores; many distinct clay films on faces of peds and few distinct clay films on rock fragments; 5 percent gravel; noneffervescent; neutral, pH 7.2; gradual wavy boundary.

Btk—23 to 35 inches (58 to 89 cm); reddish brown (5YR 5/4) clay, reddish brown (5YR 4/4), moist; 44 percent clay; moderate medium wedge and moderate coarse subangular blocky structure; very hard, very firm, very sticky and very plastic; common very fine and few medium roots; common very fine pores; many distinct clay films on faces of peds and few distinct clay films on rock fragments; few fine carbonate nodules; 5 percent gravel; slightly effervescent; slightly alkaline, pH 7.8; clear irregular boundary.

Bk—35 to 65 inches (89 to 165 cm); reddish yellow (7.5YR 6/6) loam, strong brown (7.5YR 4/6), moist; 25 percent clay; massive; moderately hard, very friable, very sticky and very plastic; few very fine roots; many very fine pores; 1 percent fine iron-manganese nodules and 2 percent fine prominent manganese coatings; common very coarse and extremely coarse carbonate masses and few medium carbonate nodules; 5 percent gravel; violently effervescent; moderately alkaline, pH 8.4 by Thymol-blue.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 60 percent

Rock fragments: 5 to 35 percent

Cracks:

Width: 0.4 to 1 inch

Depth: surface to 30 inches

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 4 dry, 3 moist

Chroma: 2 to 3 dry, 1 to 3 moist

Texture: clay, clay loam

Rock fragments: 5 to 15 percent

Effervescence: none

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Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 4 dry, 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay, clay loam

Rock fragments: 5 to 20 percent

Effervescence: none

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

Bk horizon

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 4 to 6, dry or moist

Texture: clay, clay loam, sandy clay loam, loam

Rock fragments: 5 to 60 percent

Effervescence: slight to violent

Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 9.0)

Blacktail soils

Taxonomic classification: Fine, mixed, superactive, thermic Aridic Argiustolls

Geomorphic position: generally occur on steeper back slopes

Parent material: alluvium from mixed igneous and sedimentary sources

Slope: 8 to 35 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 5 percent

woody debris: 0 percent

bare soil: 45 percent

rock fragments

fine gravel: 13 percent

medium gravel: 15 percent

coarse gravel: 10 percent

cobble: 10 percent

stone: 2 percent

Drainage class: well drained

Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)

Available water capacity total inches: 6.6 (moderate)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: high

Hydrologic group: C

Ecological site name: Loamy Slopes 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB208AZ

Present vegetation: sideoats grama, black grama, blue grama, prairie junegrass,

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sacahuista, bottlebrush squirreltail, cane beardgrass, perennial forbs, perennial grasses, shrubby buckwheat, tobosa, annual grasses

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,700 feet north and 800 feet east of southwest corner of Section 29, Township 2 S, Range 25 E

Geographic Coordinate System:

33° 13' 34.60" north, 109° 48' 34.78" west

A—0 to 3 inches (0 to 8 cm); brown (7.5YR 4/3) gravelly sandy clay loam, very dark brown (7.5YR 2.5/2), moist; 26 percent clay; weak fine and medium subangular blocky parting to strong very fine granular structure; soft, loose, moderately sticky and moderately plastic; many very fine and fine roots; many very fine pores; 15 percent gravel; noneffervescent; neutral, pH 7.2; abrupt wavy boundary.

Bt—3 to 12 inches (8 to 30 cm); dark brown (7.5YR 3/3) gravelly clay, dark brown (7.5YR 3/3), moist; 43 percent clay; strong medium and coarse subangular blocky structure; moderately hard, friable, very sticky and very plastic; many very fine and fine roots; many very fine pores; many distinct clay films on faces of peds and rock fragments; 15 percent gravel; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Btk—12 to 15 inches (30 to 38 cm); reddish brown (5YR 4/4) gravelly clay, reddish brown (5YR 4/4), moist; 41 percent clay; strong medium and coarse subangular blocky structure; very hard, extremely firm, very sticky and very plastic; common very fine and fine roots between peds; many very fine pores; very many distinct clay films on faces of peds and rock fragments; common medium carbonate masses; 15 percent gravel; slightly effervescent, 6 percent calcium carbonate equivalent; slightly alkaline, pH 7.4; abrupt wavy boundary.

2Bk—15 to 60 inches (38 to 152 cm); reddish brown (5YR 5/4) gravelly sandy clay loam, reddish brown (5YR 4/4), moist; 25 percent clay; weak coarse subangular blocky structure; moderately hard, friable, moderately sticky and moderately plastic; few very fine roots; many very fine pores; 5 percent medium iron-manganese masses; common medium carbonate masses; 25 percent gravel; slightly effervescent, 6 percent calcium carbonate equivalent; strongly alkaline, pH 8.6.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 55

Rock fragments: 2 to 20 percent

Calcium carbonate equivalent: 0 to 10 percent

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 2.5 to 3 moist

Chroma: 3 dry, 2 to 3 moist

Texture: loam, clay loam, sandy clay loam

Rock fragments: 10 to 20 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Bt horizon

Hue: 5YR, 7.5YR

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Value: 3 to 4 dry, 3 moist
Chroma: 3 to 4 dry, 3 moist
Texture: clay, clay loam
Rock fragments: 0 to 20 percent
Effervescence: none
Reaction (pH): neutral (6.6 to 7.3)

Btk horizon

Hue: 5YR, 7.5YR
Value: 3 to 4 dry, 3 moist
Chroma: 3 to 4 dry, 3 moist
Texture: clay, clay loam
Rock fragments: 0 to 20 percent
Calcium carbonate equivalent: 6 percent
Effervescence: slight to strong
Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

2Bk horizon

Hue: 5YR, 7.5YR
Value: 5 to 6 dry, 4 moist
Chroma: 3 to 4, dry or moist
Texture: clay loam, sandy clay loam
Rock fragments: 0 to 35 percent
Calcium carbonate equivalent: 6 percent
Effervescence: slight to strong
Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 9.0)

Blacktail as used in this mapping unit is a taxadjunct to the series because it does not meet the requirements for a diagnostic calcic horizon. Blacktail series is Fine, mixed, superactive, thermic Calcic Argiustolls.

82—Thimble-Rock outcrop complex, 10 to 50 percent slopes

Map Unit Setting

Landform(s): plateaus
Elevation: 5,000 to 7,000 feet (1,524 to 2,134 meters)
Mean annual precipitation: 14 to 18 inches (356 to 457 millimeters)
Mean annual air temperature: 45 to 57 degrees F (7.2 to 13.9 degrees C)
Mean annual soil temperature: 47 to 59 degrees F (8.3 to 15.0 degrees C)
Frost-free period: 120 to 180 days
Major Land Resource Area: 38-Mogollon Transition
Land Resource Unit: 38-3 Interior Chaparral-Forests

Map Unit Composition

Thimble and similar soils: 50 percent
Rock outcrop: 25 percent
Minor components: Soils that are moderately deep to bedrock occur on similar positions as Thimble. Soils that contain less clay in the subsoil occur on back slopes. Pachic Argiustolls that are deep or very deep to bedrock occur mainly on north facing slopes which support Ponderosa pine and Gambel oak. Frazwell soils occur along small drainageways.

Soil Properties and Qualities

Thimble soils

Taxonomic classification: Clayey-skeletal, smectitic, mesic Aridic Lithic Argiustolls

Geomorphic position: generally occurs on narrow summits and escarpments of the western end of the Natanes Plateau

Parent material: clayey alluvium and/or colluvium derived from basalt

Slope: 10 to 50 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

tree canopy: 20 percent

plant cover: 65 percent

organic litter: 5 percent

woody debris: 1 percent

bare soil: 2 percent

rock fragments

gravel: 40 percent

cobble: 30 percent

stone: 3 percent

Depth to restrictive feature(s): 10 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.00 to 1.98 inches per hour (0.01 to 14.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 1.2 (very low)

Shrink-swell potential: about 10.5 LEP (very high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Volcanic Hills, Clayey 20-24"

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XC317AZ

Present vegetation: sideoats grama, gray oak, alligator juniper, singleleaf pinyon, Emory oak, blue grama, prairie Junegrass, perennial forbs, bottlebrush squirreltail

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 2,250 feet north and 620 feet west of the southeast corner of Section 2, Township 3N, Range 18E

Geographic Coordinate System:

33° 37' 52.90" north, 110° 25' 48.80" west

A—0 to 3 inches (0 to 8 cm); brown (7.5YR 4/2) very cobbly loam, dark brown (7.5YR 3/2), moist; 25 percent clay; weak medium subangular blocky parting to moderate fine and medium granular structure; slightly hard, very friable, slightly sticky and

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slightly plastic; many very fine and fine roots; many very fine and fine and common medium pores; 30 percent gravel and 25 percent cobble and 1 percent stone; noneffervescent; neutral, pH 6.6; clear smooth boundary.

Bt—3 to 15 inches (8 to 38 cm); brown (7.5YR 4/3) very gravelly clay, dark brown (7.5YR 3/3), moist; 45 percent clay; moderate medium and coarse subangular blocky structure; very hard, firm, moderately sticky and moderately plastic; common very fine and fine and common medium and coarse roots; common very fine and fine and few medium pores; common distinct clay films on faces of peds and rock fragments; 30 percent gravel and 20 percent cobble; noneffervescent; neutral, pH 6.8; clear wavy boundary.

R—15 to 60 inches (38 to 152 cm); basalt bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 60 percent

Rock fragments: 35 to 65 percent

Reaction (pH): neutral to slightly alkaline (6.6-7.8)

A horizon

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 moist

Chroma: 2 to 3, dry or moist

Texture: loam, clay loam

Rock fragments: 35 to 65 percent

Effervescence: none

Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 2 to 4, dry or moist

Texture: clay loam, clay

Rock fragments: 35 to 70 percent

Effervescence: none to slight

R horizon

Bedrock is basalt

Rock outcrop

Slope: 10 to 50 percent

Range in Characteristics

Rock outcrop consists of barren rock that occurs as ledges of Tertiary basalt. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

83—Tombstone-Eloma-Pedregosa complex, 5 to 65 percent slopes

Map Unit Setting

Landform(s): fan terraces

Elevation: 3,000 to 5,000 feet (914 to 1,524 meters)

Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)

Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)

Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)

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Frost-free period: 180 to 230 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-1 Lower Interior Chaparral

Map Unit Composition

Tombstone and similar soils: 40 percent

Eloma and similar soils: 30 percent

Pedregosa and similar soils: 15 percent

Minor components: Ryallen soils occur on similar positions as Eloma. Kimrose soils occur on similar positions as Pedregosa. Torrifluvents soils and Riverwash occur in drainageways.

Soil Properties and Qualities

Tombstone soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Ustic Haplocalcids

Geomorphic position: generally occurs on shoulders and back slopes of fan terraces that overlie lacustrine sediments

Parent material: mixed loamy-skeletal alluvium

Slope: 5 to 65 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

woody debris: 1 percent

bare soil: 56 percent

rock fragments

fine gravel: 10 percent

medium gravel: 15 percent

coarse gravel: 15 percent

cobble: 2 percent

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Available water capacity total inches: 5.4 (moderate)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: Limy Slopes 12-16" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA126AZ

Present vegetation: red brome, snakeweed, fairy duster, blue threeawn, whitethorn, Parish threeawn, fluffgrass, slim tridens, bush muhly, black grama, mormon tea, mormon tea, trailing four o'clock

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 150 feet north and 2,450 feet east of southwest corner of Section 27, Township 2 N, Range 18 E

Geographic Coordinate System:

33° 28' 50.30" north, 110° 27' 17.60" west

A—0 to 2 inches (0 to 5 cm); brown (10YR 5/3) gravelly sandy loam, brown (10YR 4/3), moist; 7 percent clay; moderate thick platy and moderate medium and coarse subangular blocky structure; slightly hard, loose, slightly sticky and nonplastic; many very fine roots; many very fine pores; few prominent carbonate coats on bottom of rock fragments; 25 percent gravel and 5 percent cobble; violently effervescent; strongly alkaline, pH 8.6; abrupt wavy boundary.

Bk1—2 to 16 inches (5 to 41 cm); brown (10YR 5/3) very gravelly loam, brown (10YR 4/3), moist; 16 percent clay; moderate medium and coarse subangular blocky structure; slightly hard, loose, moderately sticky and moderately plastic; many very fine and fine and few medium and coarse roots; many very fine pores; common prominent carbonate coats around rock fragments; 35 percent gravel and 5 percent cobble; violently effervescent, 14 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; clear wavy boundary.

Bk2—16 to 60 inches (41 to 152 cm); light brown (7.5YR 6/3) very gravelly loam, brown (10YR 4/3), moist; 15 percent clay; massive; soft, loose, slightly sticky and moderately plastic; common very fine and few medium and coarse roots; many very fine pores; many prominent carbonate coats around rock fragments and common fine and medium carbonate masses on surfaces along root channels; 40 percent gravel and 15 percent cobble; violently effervescent, 13 percent calcium carbonate equivalent; strongly alkaline, pH 8.6.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 18 percent

Rock fragments: 35 to 50 percent

Depth to calcic horizon: 1 to 12 inches

Calcium carbonate equivalent: 5 to 15 percent

Effervescence: violent

Reaction (pH): strongly alkaline (8.5 to 9.0)

A horizons

Hue: 7.5YR, 10YR

Value: 5 to 6 dry, 4 to 5 moist

Chroma: 2 to 3, dry or moist

Texture: coarse sandy loam, sandy loam

Rock fragments: 30 to 60 percent

Bk horizons

Hue: 7.5YR, 10YR

Value: 5 to 6 dry, 4 to 6 moist

Chroma: 2 to 3, dry or moist

Texture: sandy loam, loam, loamy coarse sand

Rock fragments: 35 to 60 percent

Eloma soils

Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic Ustic

Haplargids

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Geomorphic position: generally occurs on summits and upper back slopes

Parent material: mixed clayey-skeletal alluvium

Slope: 5 to 35 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

woody debris: 0 percent

bare soil: 15 percent

rock fragments

fine gravel: 20 percent

medium gravel: 35 percent

coarse gravel: 15 percent

cobble: 10 percent

Drainage class: well drained

Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)

Available water capacity total inches: 5.8 (moderate)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: high

Hydrologic group: C

Ecological site name: Clayey Slopes 12-16" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA108AZ

Present vegetation: curlymesquite, sideoats grama, snakeweed, purple threeawn, black grama, false mesquite, pricklypear, mormon tea, whitethorn, catclaw acacia, hairy grama, red brome, bush muhly, banana yucca, creosotebush

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 250 feet north and 2,600 feet east of southwest corner of Section 27, Township 2 N, Range 18 E

Geographic Coordinate System:

33° 28' 50.20" north, 110° 27' 14.40" west

A—0 to 3 inches (0 to 8 cm); reddish brown (5YR 4/3) very gravelly clay, dark brown (7.5YR 3/3), moist; 43 percent clay; moderate medium and coarse subangular blocky structure; slightly hard, very friable, very sticky and moderately plastic; many very fine and fine roots; many very fine pores; 35 percent gravel and 5 percent cobble; slightly effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

Bt1—3 to 18 inches (8 to 46 cm); reddish brown (5YR 4/3) very gravelly clay, yellowish red (5YR 4/6), moist; 55 percent clay; strong medium and coarse subangular blocky structure; extremely hard, friable, very sticky and very plastic;

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many very fine and fine roots between peds; common very fine pores; common prominent pressure faces; few distinct clay films on faces of peds and rock fragments; 40 percent gravel and 5 percent cobble; very slightly effervescent; moderately alkaline, pH 8.2; gradual wavy boundary.

Bt2—18 to 48 inches (46 to 122 cm); dark reddish brown (5YR 3/4) gravelly clay, reddish brown (5YR 4/4), moist; 55 percent clay; strong coarse subangular blocky structure; extremely hard, friable, very sticky and very plastic; common very fine roots between peds; common very fine pores; common prominent pressure faces; common distinct clay films on faces of peds and rock fragments; 18 percent gravel; slightly effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

Bt3—48 to 56 inches (122 to 142 cm); strong brown (7.5YR 4/6) very stony clay, strong brown (7.5YR 4/6), moist; 43 percent clay; massive; moderately hard, friable, moderately sticky and very plastic; common very fine roots; common very fine pores; common prominent clay films on rock fragments and few distinct clay bridges between sand grains; 30 percent gravel and 10 percent cobble and 10 percent stone; slightly effervescent; moderately alkaline, pH 8.2; gradual wavy boundary.

Bt4—56 to 60 inches (142 to 152 cm); strong brown (7.5YR 4/6) very gravelly clay loam, brown (7.5YR 4/4), moist; 39 percent clay; massive; moderately hard, friable, moderately sticky and very plastic; few very fine roots; common very fine pores; few distinct clay films on rock fragments and few distinct clay bridges between sand grains; 40 percent gravel and 10 percent cobble; very slightly effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 55 percent

Rock fragments: 35 to 50 percent

Effervescence: none to slight

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

A horizon

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 3 to 4 moist

Chroma: 2 to 3 dry, 3 to 4 moist

Texture: clay, clay loam, sandy clay loam

Rock fragments: 30 to 60 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 4, dry or moist

Chroma: 3 to 6 dry, 4 to 6 moist

Texture: clay loam, clay

Rock fragments: 15 to 60 percent

Pedregosa soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic, shallow Calcic Petrocalcids

Geomorphic position: generally occurs on summits and upper back slopes

Parent material: mixed loamy-skeletal alluvium

Slope: 5 to 65 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

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lichen: 0 percent
moss: 0 percent
Chemical crust
salt: 0 percent
gypsum: 0 percent
Physical cover
canopy plant cover: 45 percent
woody debris: 2 percent
bare soil: 63 percent
rock fragments
fine gravel: 10 percent
medium gravel: 10 percent
coarse gravel: 10 percent
cobble: 5 percent
Depth to restrictive feature(s): 5 to 16 inches to petrocalcic
Drainage class: well drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.60 inches per hour (0.00 to 4.20 micrometers per second)
Available water capacity total inches: 0.7 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: high
Hydrologic group: D
Ecological site name: Limy Upland 12-16" p.z.
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.
Ecological site number: R038XA106AZ
Present vegetation: red brome, creosotebush, velvet mesquite, Mediterranean schismus-obselete, whitethorn, blue threeawn, black grama, canotia, fluffgrass, barrel cactus, mormon tea, redstem filaree, bush muhly, pricklypear, slim tridens, banana yucca
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 600 feet north and 2,350 feet west of southeast corner of Section 27, Township 2 N, Range 18 E

Geographic Coordinate System:

33° 28' 53.80" north, 110° 27' 10.70" west

A—0 to 1 inch (0 to 3 cm); pinkish gray (7.5YR 6/2) very gravelly loam, brown (7.5YR 4/2), moist; 10 percent clay; moderate thick platy parting to moderate fine and medium granular structure; soft, very friable, slightly sticky and nonplastic; many very fine roots; many very fine pores; 35 percent gravel and 5 percent cobble; violently effervescent; strongly alkaline, pH 8.6; abrupt wavy boundary.

Bk—1 to 8 inches (3 to 20 cm); pinkish gray (7.5YR 6/2) very gravelly loam, brown (7.5YR 4/2), moist; 12 percent clay; moderate fine and medium subangular blocky parting to moderate medium and coarse granular structure; soft, very friable, slightly sticky and nonplastic; many very fine and fine and common medium roots; many very fine and common medium pores; common medium and coarse carbonate nodules around rock fragments and in matrix; 35 percent gravel and 10 percent cobble;

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violently effervescent, 20 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; abrupt wavy boundary.

Bkm—8 to 19 inches (20 to 48 cm); white (10YR 8/1) cemented material, petrocalcic; massive; very rigid; common very fine roots in cracks; common very fine pores; common distinct carbonate coats on rock fragments; 30 percent gravel; violently effervescent, 50 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; clear wavy boundary.

2Ck—19 to 60 inches (48 to 152 cm); white (10YR 8/1) and strong brown (7.5YR 4/6) extremely cobbly loam, light brown (7.5YR 6/3), moist; 10 percent clay; massive; slightly hard, friable, nonsticky and nonplastic; many very fine and fine and few medium roots; many very fine pores; common distinct carbonate coats on rock fragments; 45 percent gravel and 20 percent cobble and 10 percent stone; violently effervescent, 29 percent calcium carbonate equivalent; moderately alkaline, pH 8.4.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 8 to 18 percent

Rock fragments: 35 to 45 percent

Calcium carbonate equivalent: 10 to 50 percent

A horizon

Hue: 7.5YR, 10YR

Value: 5 to 6 dry, 2 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: loam, sandy loam

Rock fragments: 5 to 40 percent

Effervescence: strong to violent

Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 9.0)

Bk horizons

Hue: 7.5YR, 10YR

Value: 5 to 6 dry, 4 to 6 moist

Chroma: 2 to 3, dry or moist

Texture: loam, sandy loam

Rock fragments: 5 to 45 percent

Effervescence: strong to violent

Reaction (pH): moderately alkaline to strongly alkaline (7.9 to 9.0)

Bkm horizon

Hue: 10YR

Value: 8 dry, 7 moist

Chroma: 1 dry, 3 moist

Thickness of petrocalcic: 6 to 12 inches

Indurated and fractured petrocalcic with troweled laminar cap below solum, cemented with carbonates.

Ck horizons

Hue: 7.5YR, 10YR

Value: 4 to 8 dry, 5 to 6 moist

Chroma: 1 to 6 dry, 3 moist

Texture: loam, sandy loam

Rock fragments: 35 to 75 percent

Effervescence: violent

Reaction (pH): moderately alkaline (7.9 to 8.4)

84—Tombstone-Torriorthents complex, 5 to 70 percent slopes

Map Unit Setting

Landform(s): fan terraces

Elevation: 3,000 to 5,000 feet (914 to 1,524 meters)

Mean annual precipitation: 12 to 16 inches (305 to 406 millimeters)

Mean annual air temperature: 57 to 65 degrees F (13.9 to 18.3 degrees C)

Mean annual soil temperature: 59 to 67 degrees F (15.0 to 19.4 degrees C)

Frost-free period: 180 to 230 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-1 Lower Interior Chaparral

Map Unit Composition

Tombstone and similar soils: 45 percent

Torriorthents and similar soils: 40 percent

Minor components: Eloma soils occur on more stable summits. Ryallen and Bigtoe soils occur on shoulder and back slopes. Ubik soils and Riverwash occur in drainageways.

Soil Properties and Qualities

Tombstone soils

Taxonomic classification: Sandy-skeletal, mixed, superactive, thermic Ustic Haplocalcids

Geomorphic position: generally occurs on summits and upper back slopes of fan terraces that overlie lacustrine sediments

Parent material: mixed alluvium

Slope: 5 to 60 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 2 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

woody debris: 0 percent

bare soil: 5 percent

rock fragments

gravel: 82 percent

cobble: 5 percent

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 39.69 inches per hour (14.00 to 280.00 micrometers per second)

Available water capacity total inches: 2.8 (low)

Shrink-swell potential: about 2.0 LEP (low)

Flooding hazard: none

Runoff class: low

Hydrologic group: A

Ecological site name: Limy Slopes 12-16" p.z.

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Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA126AZ

Present vegetation: black grama, broom snakeweed, bush muhly, catclaw acacia, creosotebush, mormon tea, sideoats grama, spidergrass, whitethorn acacia

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 750 feet south and 300 feet east of northwest corner of Section 16, Township 5 S, Range 22 E

Geographic Coordinate System:

33° 0' 14.50" north, 110° 6' 8.10" west

A—0 to 2 inches (0 to 5 cm); brown (10YR 5/3) very gravelly loam, dark grayish brown (10YR 4/2), moist; 17 percent clay; weak very fine and fine granular structure; soft, loose, nonsticky and nonplastic; many very fine roots; many very fine and fine pores; 50 percent gravel; strongly effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

Bk1—2 to 12 inches (5 to 30 cm); pale brown (10YR 6/3) very gravelly sandy loam, brown (10YR 5/3), moist; 15 percent clay; weak very fine and fine subangular blocky parting to weak very fine and fine granular structure; soft, loose, nonsticky and nonplastic; many very fine and common medium and coarse roots; many very fine and fine pores; common carbonate concretions around rock fragments; 45 percent gravel; violently effervescent; moderately alkaline, pH 8.4; abrupt wavy boundary.

Bk2—12 to 60 inches (30 to 152 cm); pale brown (10YR 6/3) very gravelly loamy coarse sand, brown (10YR 5/3), moist; 9 percent clay; weak very fine subangular blocky parting to weak very fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and common medium and coarse roots; many very fine pores; common carbonate concretions around rock fragments; 55 percent gravel; violently effervescent; moderately alkaline, pH 8.4.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 15 percent

Rock fragments: 35 to 60 percent

Depth to calcic horizon: 1 to 15 inches

Calcium carbonate equivalent: 2 to 20 percent

Effervescence: strong to violent

Reaction (pH): moderately alkaline (7.9 to 8.4)

A horizon

Hue: 10YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 2 to 3, dry or moist

Texture: coarse sandy loam, loam, sandy loam

Rock fragments: 35 to 60 percent

Bk horizons

Hue: 7.5YR, 10YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 2 to 3, dry or moist

Texture: sandy loam, coarse sandy loam, loamy coarse sand

Rock fragments: 35 to 60 percent

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Tombstone as used in this mapping unit is a taxadjunct to the series because it has a sandy-skeletal particle-size control section. Tombstone series is Loamy-skeletal, mixed, superactive, thermic Ustic Haplocalcids

Torriorthents soils

Taxonomic classification: Torriorthents

Geomorphic position: generally occurs on back slopes of fan terraces that overlie lacustrine sediments

Parent material: mixed alluvium

Slope: 15 to 70 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 2 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

woody debris: 0 percent

bare soil: 15 percent

rock fragments

gravel: 50 percent

cobble: 15 percent

stone: 5 percent

Drainage class: well drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Available water capacity total inches: 6.0 (moderate)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: very high

Hydrologic group: C

Ecological site name: Limy Slopes 12-16" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XA126AZ

Present vegetation: annual grasses, annual forbs, black grama, broom snakeweed, bush muhly, creosotebush, catclaw acacia, false mesquite, mormon tea, purple threeawn, range ratany, sideoats grama, whitethorn acacia

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,250 feet north and 350 feet west of southeast corner of Section 17, Township 5 S, Range 22 E

Geographic Coordinate System:

32° 59' 41.10" north, 110° 6' 14.32" west

C1—0 to 1 inch (0 to 2 cm); brown (10YR 5/3) very gravelly coarse sandy loam, brown (10YR 4/3), moist; 12 percent clay; weak medium platy structure; soft, very

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friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 40 percent gravel and 5 percent cobble; noneffervescent; slightly alkaline, pH 7.8; clear wavy boundary.

C2—1 to 33 inches (2 to 84 cm); brown (7.5YR 4/4) gravelly sandy clay loam, brown (7.5YR 4/3), moist; 24 percent clay; massive; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine and fine pores; 25 percent gravel and 5 percent cobble; noneffervescent; moderately alkaline, pH 8.0; clear wavy boundary.

C3—33 to 60 inches (84 to 152 cm); brown (10YR 5/3) gravelly coarse sandy loam, brown (10YR 4/3), moist; 12 percent clay; massive; soft, very friable, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine pores; 20 percent gravel; noneffervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 8 to 25 percent

Rock fragments: 20 to 60 percent

Effervescence: none to strong

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

C1 horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 3, dry or moist

Texture: sandy loam, loam, coarse sandy loam, sandy clay loam

Rock fragments: 35 to 60 percent

Lower C horizons

Hue: 7.5YR, 10YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 3 to 4, dry or moist

Texture: loam, clay loam, sandy clay loam, coarse sandy loam

Rock fragments: 20 to 60 percent

85—Topawa very gravelly sandy loam, 3 to 15 percent slopes

Map Unit Setting

Landform(s): fan terraces

Elevation: 2,500 to 3,600 feet (762 to 1,097 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 60 to 67 degrees F (15.6 to 19.4 degrees C)

Mean annual soil temperature: 62 to 69 degrees F (16.7 to 20.5 degrees C)

Frost-free period: 190 to 250 days

Major Land Resource Area: 41-Southeastern Arizona Basin and Range

Land Resource Unit: 41-2 Chihuahuan-Sonoran Desert Shrub Mix

Map Unit Composition

Topawa and similar soils: 90 percent

Minor components: Eba, Stagecoach and Torriorthents soils occur in eroded areas.

Queencreek and Brazito soils occur in drainageways.

Soil Properties and Qualities

Topawa soils

Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic Typic

Haplargids

Geomorphic position: generally occurs on summits and shoulder slopes

Parent material: mixed clayey-skeletal alluvium

Slope: 3 to 15 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 1 percent

moss: 1 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 30 percent

woody debris: 0 percent

bare soil: 18 percent

rock fragments

gravel: 52 percent

cobble: 5 percent

Drainage class: well drained

Ksat solum: 0.06 to 5.95 inches per hour (0.42 to 42.00 micrometers per second)

Available water capacity total inches: 4.5 (low)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: low

Hydrologic group: C

Ecological site name: Loamy Upland 8-12" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R041XB210AZ

Present vegetation: tobosa, whitethorn acacia, annual grasses, bush muhly, snakeweed, threeawn, jojoba, mesquite, perennial forbs

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 700 feet west and 450 feet south of northeast corner of Section 25, Township 4 S, Range 21 E

Geographic Coordinate System:

33° 3' 45.00" north, 110° 8' 22.00" west

A—0 to 1 inch (0 to 3 cm); brown (7.5YR 4/4) very gravelly sandy loam, dark brown (7.5YR 3/3), moist; 9 percent clay; moderate medium platy parting to weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 40 percent gravel; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt1—1 to 11 inches (3 to 28 cm); reddish brown (5YR 4/4) very gravelly sandy clay, dark reddish brown (5YR 3/4), moist; 44 percent clay; strong medium and coarse subangular blocky and strong medium and coarse angular blocky structure; hard,

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friable, very sticky and very plastic; many very fine and fine and common medium and coarse roots; many very fine and fine pores; many distinct clay films on faces of peds and rock fragments and few distinct clay bridges between sand grains; 40 percent gravel; noneffervescent; neutral, pH 7.2; diffuse wavy boundary.

Bt2—11 to 34 inches (28 to 86 cm); yellowish red (5YR 4/6) very gravelly sandy clay, reddish brown (5YR 4/4), moist; 39 percent clay; strong medium and coarse angular blocky and strong medium and coarse subangular blocky structure; hard, friable, very sticky and very plastic; few fine and medium roots; many very fine and fine pores; many distinct clay films on faces of peds and rock fragments and few distinct clay bridges between sand grains; 45 percent gravel and 3 percent cobble and 3 percent stone; noneffervescent; slightly alkaline, pH 7.8; abrupt wavy boundary.

2Btk—34 to 60 inches (86 to 152 cm); brown (7.5YR 5/4) very gravelly sandy loam, brown (7.5YR 4/4), moist; 18 percent clay; strong medium and coarse angular blocky and strong medium and coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine and medium roots; many very fine and fine pores; few faint clay films on faces of peds and rock fragments; few fine carbonate masses; 50 percent gravel; strongly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 40 to 55 percent

Rock fragments: 35 to 60 percent

A horizon

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Texture: sandy loam, sandy clay loam

Rock fragments: 15 to 60 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 4, dry or moist

Chroma: 3 to 6 dry, 3 to 4 moist

Texture: sandy clay, clay

Rock fragments: 35 to 60 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Btk horizons

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2 to 4 moist

Chroma: 3 to 5, dry or moist

Texture: sandy loam, sandy clay loam

Rock fragments: 35 to 60 percent

Calcium carbonate equivalent: 2 to 10 percent

Effervescence: strong to violent

Reaction (pH): moderately alkaline (7.9 to 8.4)

Topawa as used in this mapping unit is a taxadjunct to the series because the particle-size class is clayey-skeletal instead of loamy-skeletal. Topawa series is Loamy-skeletal, mixed, superactive, thermic Typic Haplargids.

86—Topawa-Rillino-Eba complex, 3 to 50 percent slopes

Map Unit Setting

Landform(s): fan terraces

Elevation: 2,500 to 3,800 feet (762 to 1,158 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 60 to 67 degrees F (15.6 to 19.4 degrees C)

Mean annual soil temperature: 62 to 69 degrees F (16.7 to 20.5 degrees C)

Frost-free period: 190 to 250 days

Major Land Resource Area: 41-Southeastern Arizona Basin and Range

Land Resource Unit: 41-2 Chihuahuan-Sonoran Desert Shrub Mix

Map Unit Composition

Topawa and similar soils: 40 percent

Rillino and similar soils: 25 percent

Eba and similar soils: 20 percent

Minor components: Soils that are similar to Eba, but have less than 35 percent clay or have less than 35 percent rock fragments. Torriorthents soils occur on more erosional areas. Queenecreek, Anthony and Brazito soils occur in drainageways.

Soil Properties and Qualities

Topawa soils

Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic Typic Haplargids

Geomorphic position: generally occurs on summits and upper back slopes

Parent material: mixed clayey-skeletal alluvium

Slope: 3 to 45 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 2 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent

woody debris: 0 percent

bare soil: 5 percent

rock fragments

gravel: 35 percent

cobble: 5 percent

Drainage class: well drained

Ksat solum: 0.06 to 5.95 inches per hour (0.42 to 42.00 micrometers per second)

Available water capacity total inches: 4.9 (low)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: low

Hydrologic group: C

Ecological site name: Loamy Upland 8-12" p.z.

Other ecological sites may occur in this map unit and vary in extent between

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delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R041XB210AZ

Present vegetation: tobosa, whitethorn acacia, annual grasses, bush muhly, snakeweed, threeawn, jojoba, mesquite, perennial forbs

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 100 feet north and 2,600 feet east of southwest corner of Section 22, Township 5 S, Range 22 E

Geographic Coordinate System:

32° 58' 36.05" north, 110° 4' 38.77" west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/4) gravelly sandy loam, brown (7.5YR 4/4), moist; 9 percent clay; strong very thick platy structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 15 percent gravel; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt1—2 to 6 inches (5 to 15 cm); strong brown (7.5YR 4/6) gravelly sandy clay loam, reddish brown (5YR 4/4), moist; 29 percent clay; moderate fine and medium subangular blocky structure; slightly hard, very friable, moderately sticky and moderately plastic; many very fine and fine and few medium roots; many very fine and fine and few medium pores; common faint clay films on faces of peds and few faint clay bridges between sand grains; 25 percent gravel; noneffervescent; neutral, pH 7.2; clear wavy boundary.

Bt2—6 to 19 inches (15 to 48 cm); reddish brown (5YR 4/4) very gravelly clay, reddish brown (5YR 4/4), moist; 49 percent clay; strong medium and coarse angular blocky structure; very hard, firm, very sticky and very plastic; many very fine and fine roots; many very fine and fine pores; very many prominent clay films on faces of peds and many distinct clay bridges between sand grains; 40 percent gravel; very slightly effervescent; slightly alkaline, pH 7.8; gradual wavy boundary.

Bt3—19 to 60 inches (48 to 152 cm); reddish brown (5YR 4/4) very gravelly sandy clay, reddish brown (5YR 4/4), moist; 42 percent clay; strong medium and coarse angular blocky structure; very hard, firm, very sticky and very plastic; common very fine and fine roots; common very fine and fine pores; many prominent clay films on faces of peds and many distinct clay bridges between sand grains; 55 percent gravel; strongly effervescent; strongly alkaline, pH 8.6.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 45 percent

Rock fragments: 35 to 45 percent

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 6 dry, 3 to 5 moist

Chroma: 3 to 4, dry or moist

Texture: loam, coarse sandy loam, sandy loam, sandy clay loam

Rock fragments: 15 to 30 percent

Effervescence: none

Bt horizons

Hue: 5YR, 7.5YR

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Value: 3 to 6, dry or moist
Chroma: 4 to 6, dry or moist
Texture: clay loam, sandy clay loam, clay, sandy clay
Rock fragments: 15 to 45 percent
Effervescence: none to slight

Topawa as used in this mapping unit is a taxadjunct to the series because the particle-size class is clayey-skeletal instead of loamy-skeletal. Topawa series is Loamy-skeletal, mixed, superactive, thermic Typic Haplargids.

Rillino soils

Taxonomic classification: Coarse-loamy, mixed, superactive, thermic Typic Haplocalcids

Geomorphic position: generally occurs on back slopes

Parent material: mixed coarse-loamy alluvium

Slope: 3 to 50 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 45 percent

woody debris: 0 percent

bare soil: 20 percent

rock fragments

gravel: 30 percent

Drainage class: well drained

Ksat solum: 1.98 to 39.69 inches per hour (14.00 to 280.00 micrometers per second)

Available water capacity total inches: 5.3 (moderate)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very low

Hydrologic group: A

Ecological site name: Limy Slopes 8-12" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R041XB207AZ

Present vegetation: whitethorn, creosotebush, bush muhly, annual grasses, desert zinnia, perennial grasses

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 2,100 feet south and 1,600 feet west of northeast corner of Section 21, Township 5 S, Range 22 E

Geographic Coordinate System:

32° 59' 6.43" north, 110° 5' 27.13" west

A—0 to 3 inches (0 to 8 cm); brown (10YR 5/3) sandy loam, brown (7.5YR 4/2),

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moist; 17 percent clay; moderate fine and medium granular structure; soft, very friable, slightly sticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 8 percent gravel; slightly effervescent, 2 percent gypsum; slightly alkaline, pH 7.4; clear smooth boundary.

Bk1—3 to 13 inches (8 to 33 cm); brown (10YR 5/3) sandy loam, brown (7.5YR 4/3), moist; 17 percent clay; moderate fine and medium subangular blocky structure; soft, very friable, slightly sticky and nonplastic; many very fine and fine and few coarse roots; many very fine and fine pores; few carbonate coats on rock fragments; 8 percent gravel and 3 percent cobble; strongly effervescent; slightly alkaline, pH 7.8; clear wavy boundary.

Bk2—13 to 29 inches (33 to 74 cm); pale brown (10YR 6/3) gravelly sandy loam, brown (7.5YR 5/3), moist; 14 percent clay; massive; soft, very friable, slightly sticky and nonplastic; many very fine and fine roots; many very fine and fine pores; many carbonate coats on rock fragments; 17 percent gravel and 3 percent cobble; violently effervescent, 9 percent calcium carbonate equivalent; moderately alkaline, pH 8.0; clear wavy boundary.

Bk3—29 to 49 inches (74 to 124 cm); pale brown (10YR 6/3) gravelly coarse sandy loam, brown (10YR 5/3), moist; 9 percent clay; massive; loose, nonsticky and nonplastic; common very fine and fine roots; many fine and many medium pores; many carbonate coats on rock fragments; common coarse carbonate masses; 30 percent gravel and 3 percent cobble; violently effervescent, 14 percent calcium carbonate equivalent; moderately alkaline, pH 8.0; abrupt wavy boundary.

2C—49 to 60 inches (124 to 152 cm); light yellowish brown (10YR 6/4) loamy coarse sand, yellowish brown (10YR 5/4), moist; 4 percent clay; massive; hard, loose, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine pores; 10 percent gravel; slightly effervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 10 to 18 percent

Rock fragments: 15 to 35 percent

Calcium carbonate equivalent: 5 to 15 percent

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: sandy loam, coarse sandy loam, sandy clay loam

Rock fragments: 5 to 20 percent

Effervescence: slight to violent

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

Bk horizons

Hue: 7.5YR, 10YR

Value: 5 to 7 dry, 4 to 6 moist

Chroma: 2 to 4, dry or moist

Texture: loam, sandy loam, coarse sandy loam

Rock fragments: 10 to 35 percent

Effervescence: strong to violent

Reaction (pH): moderately alkaline to strongly alkaline (7.9 to 9.0)

C horizon (where present)

Hue: 7.5YR, 10YR

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Value: 5 to 7 dry, 4 to 6 moist
Chroma: 2 to 4, dry or moist
Texture: coarse sandy loam, loamy coarse sand
Rock fragments: 5 to 35 percent
Effervescence: slight to strong
Reaction (pH): moderately alkaline (7.9 to 8.4)

Eba soils

Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic Typic Calciargids

Geomorphic position: generally occurs on shoulder and back slopes

Parent material: mixed clayey-skeletal alluvium

Slope: 3 to 50 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 50 percent

woody debris: 0 percent

bare soil: 5 percent

rock fragments

gravel: 80 percent

Drainage class: well drained

Ksat solum: 0.06 to 19.98 inches per hour (0.42 to 141.00 micrometers per second)

Available water capacity total inches: 3.3 (low)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: medium

Hydrologic group: C

Ecological site name: Clayey Slopes 8-12" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R041XB216AZ

Present vegetation: tobosa, whitethorn, perennial grasses, threeawn, annual grasses, jojoba, mesquite, perennial forbs, pricklypear

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 2,100 feet south and 2,100 feet east of northwest corner of Section 21, Township 5 S, Range 22 E

Geographic Coordinate System:

32° 59' 6.89" north, 110° 5' 45.94" west

A—0 to 0.5 inches (0 to 1 cm); brown (10YR 5/3) gravelly sandy loam, brown (10YR 4/3), moist; 14 percent clay; weak medium platy structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 25 percent gravel; noneffervescent; slightly alkaline, pH 7.6; clear smooth boundary.

Bt1—0.5 to 2 inches (1 to 5 cm); brown (7.5YR 4/4) gravelly sandy clay, brown

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(7.5YR 4/3), moist; 37 percent clay; strong medium and coarse subangular blocky structure; slightly hard, friable, very sticky and very plastic; many very fine and fine roots; many fine and medium pores; many distinct clay films on faces of peds and rock fragments; 20 percent gravel; noneffervescent; slightly alkaline, pH 7.6; clear wavy boundary.

Bt2—2 to 9 inches (5 to 23 cm); brown (7.5YR 4/4) gravelly clay, brown (7.5YR 4/3), moist; 42 percent clay; strong medium and coarse subangular blocky structure; hard, friable, very sticky and very plastic; many very fine and fine and few medium and coarse roots; many fine and medium pores; very many distinct clay films on faces of peds, rock fragments, and surfaces along root channels; 20 percent gravel; strongly effervescent, 6 percent calcium carbonate equivalent; slightly alkaline, pH 7.8; clear wavy boundary.

Btk—9 to 30 inches (23 to 76 cm); yellowish red (5YR 4/6) very gravelly sandy clay, reddish brown (5YR 4/4), moist; 37 percent clay; moderate very fine and fine angular blocky structure; slightly hard, friable, very sticky and very plastic; common very fine and fine roots; common fine, medium, and coarse pores; many distinct clay films on faces of peds, rock fragments, and surfaces along root channels; many fine carbonate masses; 50 percent gravel and 3 percent cobble; violently effervescent, 6 percent calcium carbonate equivalent; strongly alkaline, pH 8.6; abrupt smooth boundary.

Bk—30 to 60 inches (76 to 152 cm); very pale brown (10YR 7/3) extremely gravelly loamy sand, pale brown (10YR 6/3), moist; 4 percent clay; massive; hard, firm, nonsticky and nonplastic; common very fine and fine roots; common very fine and fine pores; common fine carbonate masses; 60 percent gravel and 7 percent cobble; violently effervescent, 23 percent calcium carbonate equivalent; strongly alkaline, pH 8.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 35 to 45 percent

Rock fragments: 35 to 45 percent

Calcium carbonate equivalent: 0 to 30 percent

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Texture: sandy loam, sandy clay loam

Rock fragments: 15 to 30 percent

Effervescence: none

Reaction (pH): neutral (6.6 to 7.3)

Bt horizons

Hue: 5YR, 7.5YR

Value: 4 to 6 dry, 4 to 5 moist

Chroma: 3 to 6, dry or moist

Texture: clay loam, clay, sandy clay

Rock fragments: 15 to 40 percent

Effervescence: none to violent

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

Bk horizons

Hue: 10YR

Value: 5 to 7 dry, 4 to 6 moist

Chroma: 3 to 4, dry or moist
Texture: loamy sand
Rock fragments: 60 to 80 percent
Effervescence: strong to violent
Reaction (pH): strongly alkaline (8.5 to 9.0)

87—Torriorthents, 3 to 60 percent slopes

Map Unit Setting

Landform(s): fan terraces
Elevation: 2,500 to 4,000 feet (762 to 1,219 meters)
Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.6 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.7 to 20.5 degrees C)
Frost-free period: 190 to 250 days
Major Land Resource Area: 41-Southeastern Arizona Basin and Range
Land Resource Unit: 41-2 Chihuahuan-Sonoran Desert Shrub Mix

Map Unit Composition

Torriorthents and similar soils: 75 percent
Minor components: Topawa soils occur on more stable summits. Eba, Rillino, and Stagecoach soils occur on shoulders and back slopes. Riverwash occurs in drainageways. Outcrops of very weakly to moderately cemented sandstone and siltstone occur on steeper back slopes.

Soil Properties and Qualities

Torriorthents soils

Taxonomic classification: Torriorthents
Geomorphic position: generally occurs on back slopes
Parent material: lacustrine deposits of Pliocene and Pleistocene age
Slope: 3 to 60 percent
Surface cover:
 Biological crust
 cyanobacteria: 0 percent
 lichen: 5 percent
 moss: 0 percent
 Chemical crust
 salt: 0 percent
 gypsum: 0 percent
 Physical cover
 canopy plant cover: 25 percent
 woody debris: 0 percent
 bare soil: 10 percent
 rock fragments
 gravel: 90 percent
 cobble: 5 percent
 flagstone: 5 percent
Drainage class: well drained
Ksat solum: 0.06 to 1.98 inches per hour (0.42 to 14.00 micrometers per second)
Available water capacity total inches: 10.3 (very high)
Shrink-swell potential: about 7.5 LEP (high)
Flooding hazard: none

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Runoff class: very high

Hydrologic group: C

Ecological site name: Limy Slopes 8-12" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R041XB207AZ

Present vegetation: canotia, whitethorn, creosotebush, perennial forbs, ephedra, desert zinnia, perennial grasses, range ratany, rayless goldenhead

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 1,250 feet north and 800 feet west of southeast corner of Section 10, Township 5 S, Range 22 E

Geographic Coordinate System:

33° 0' 32.70" north, 110° 4' 17.07" west

AC—0 to 1 inch (0 to 3 cm); light yellowish brown (10YR 6/4) loam, yellowish brown (10YR 5/4), moist; 19 percent clay; moderate medium platy structure; soft, very friable, slightly sticky and moderately plastic; few very fine roots; many very fine and fine pores; 5 percent gravel; strongly effervescent; strongly alkaline, pH 8.8; clear wavy boundary.

C1—1 to 18 inches (3 to 46 cm); light brown (7.5YR 6/4) clay, brown (7.5YR 5/4), moist; 42 percent clay; massive; extremely hard, friable, very sticky and very plastic; common fine and medium roots; many fine and many medium pores; strongly effervescent; strongly alkaline, pH 8.8; clear wavy boundary.

C2—18 to 27 inches (46 to 69 cm); light brown (7.5YR 6/3) clay, brown (7.5YR 5/4), moist; 42 percent clay; massive; extremely hard, friable, very sticky and very plastic; common fine roots in cracks; many fine and many medium pores; noneffervescent; slightly alkaline, pH 7.8; clear wavy boundary.

C3—27 to 60 inches (69 to 152 cm); light brown (7.5YR 6/4) clay loam, brown (7.5YR 5/4), moist; 32 percent clay; massive; extremely hard, friable, very sticky and very plastic; common fine and medium roots in cracks; many fine pores; 3 percent gravel; noneffervescent; moderately alkaline, pH 8.0.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 10 to 50 percent

Rock fragments: 0 to 45 percent

Gypsum: 0 to 5 percent

Effervescence: none to violent

Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 9.0)

A horizon

Hue: 7.5YR, 10YR

Value: 5 to 7 dry, 4 to 6 moist

Chroma: 3 to 4, dry or moist

Texture: sandy loam, sandy clay loam, silty clay loam, loam

Rock fragments: 5 to 65 percent

C horizons

Hue: 7.5YR, 10YR

Value: 5 to 6 dry, 4 to 5 moist

Chroma: 3 to 4, dry or moist
Texture: sandy loam, sandy clay loam, clay loam, clay
Rock fragments: 0 to 50 percent

88—Turist family-Rock outcrop complex, 15 to 40 percent slopes

Map Unit Setting

Landform(s): hills, mountains
Elevation: 3,200 to 4,200 feet (975 to 1,280 meters)
Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)
Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)
Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)
Frost-free period: 160 to 210 days
Major Land Resource Area: 38-Mogollon Transition
Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Turist family and similar soils: 53 percent
Rock outcrop: 32 percent
Minor components: Cherrycow and Ustorthents soils occur on similar positions as Turist soils.

Soil Properties and Qualities

Turist family soils

Series and series family designations are naming expedients and equal.

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Aridic Lithic
Haplustepts

Geomorphic position: generally occurs on shoulders and back slopes

Parent material: residuum weathered from andesite

Slope: 15 to 40 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 50 percent

 woody debris: 5 percent

 bare soil: 10 percent

 rock fragments

 fine gravel: 25 percent

 medium gravel: 10 percent

 coarse gravel: 15 percent

 cobble: 20 percent

Depth to restrictive feature(s): 4 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.20 to 19.98 inches per hour (1.40 to 141.00 micrometers per second)

Soil Survey of San Carlos Indian Reservation, Arizona

Ksat restrictive layer: 0.01 to 19.98 inches per hour (0.07 to 141.00 micrometers per second)

Available water capacity total inches: 0.4 (very low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Clayey Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB215AZ

Present vegetation: perennial grasses, plains lovegrass, prairie Junegrass, sideoats grama, agave, Arizona white oak, Emory oak, blue grama, false mesquite, juniper, perennial forbs, purple grama, sacahuista, shrubby buckwheat, singleleaf pinyon, turbinella oak

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 150 feet north and 250 feet east of southwest corner of Section 36, Township 4 S, Range 18 E

Geographic Coordinate System:

33° 2' 4.91" north, 110° 27' 56.65" west

A—0 to 1 inch (0 to 2 cm); dark gray (10YR 4/1) extremely gravelly loamy sand, very dark gray (7.5YR 3/1), moist; 5 percent clay; single grain; loose, nonsticky and nonplastic; many very fine pores; 50 percent gravel and 20 percent cobble; noneffervescent; neutral, pH 7.2; abrupt smooth boundary.

Bw—1 to 6 inches (2 to 15 cm); brown (7.5YR 4/2) very gravelly sandy clay loam, dark brown (7.5YR 3/2), moist; 20 percent clay; weak very fine and fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; common very fine pores; 38 percent gravel; noneffervescent; neutral, pH 7.2; abrupt irregular boundary.

R—6 to 60 inches (15 to 152 cm); andesite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 15 to 22 percent

Rock fragments: 35 to 60 percent

Effervescence: none to very slight

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 2 to 4 moist

Chroma: 1 to 3, dry or moist

Texture: loam, sandy loam, loamy sand

Rock fragments: 20 to 70 percent

Bw horizons

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 3, dry or moist

Soil Survey of San Carlos Indian Reservation, Arizona

Texture: loam, sandy loam, sandy clay loam
Rock fragments: 40 to 70 percent

R horizon

Bedrock is andesite

Rock outcrop

Slope: 15 to 40 percent

Range in Characteristics

Rock outcrop consists of barren bedrock that occurs as low outcrops and ledges of Tertiary andesite. It also includes areas where the depth to bedrock is less than four inches. Most rock outcrops are hard rock, but some are soft.

89—Turquoise-Coppercan complex, 5 to 45 percent slopes

Map Unit Setting

Landform(s): hills, mountains

Elevation: 4,000 to 5,980 feet (1,219 to 1,824 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Turquoise and similar soils: 55 percent

Coppercan and similar soils: 25 percent

Minor components: Terrarossa soils occur on less sloping areas. Rock outcrop occurs throughout the map unit. Riverwash occurs in drainageways.

Soil Properties and Qualities

Turquoise soils

Taxonomic classification: Loamy, mixed, superactive, nonacid, thermic, shallow Aridic Ustorthents

Geomorphic position: generally occurs on summits and back slopes

Parent material: alluvium and/or residuum weathered from granite

Slope: 5 to 45 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 80 percent

woody debris: 65 percent

bare soil: 15 percent

Soil Survey of San Carlos Indian Reservation, Arizona

rock fragments
gravel: 35 percent
Depth to restrictive feature(s): 5 to 20 inches to bedrock, paralithic
Drainage class: well drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)
Available water capacity total inches: 1.3 (very low)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: none
Runoff class: very high
Hydrologic group: D
Ecological site name: Granitic Hills 16-20" p.z.
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.
Ecological site number: R038XB204AZ
Present vegetation: turbinella oak, banana yucca, manzanita, singleleaf pinyon, sumac, mountain mahogany, silktassel, juniper, mimosa
Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: Typical pedon description is from Soil Survey of Eastern Pinal and Southern Gila Counties, Arizona; about 1,400 feet west and 2,000 feet north of the southeast corner of Section 20, Township 2 S, Range 15 E

Geographic Coordinate System:

33° 14' 42.20" north, 110° 49' 41.70" west

A1—0 to 1 inch (0 to 3 cm); brown (7.5YR 5/4) gravelly sandy loam, dark brown (7.5YR 3/2), moist; 13 percent clay; weak medium platy parting to weak very fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots; many fine pores; 20 percent gravel; noneffervescent; neutral, pH 7.0; clear smooth boundary.

A2—1 to 14 inches (3 to 36 cm); brown (7.5YR 5/4) gravelly sandy loam, dark brown (7.5YR 3/4), moist; 15 percent clay; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine and fine roots; many fine pores; 25 percent gravel; noneffervescent; neutral, pH 7.0; abrupt wavy boundary.

Cr—14 to 60 inches (36 to 152 cm); weathered granite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 7 to 18 percent

Rock fragments: 15 to 30 percent

Effervescence: none

Reaction (pH): neutral (6.6 to 7.3)

A horizons

Hue: 7.5YR

Value: 4 to 5 dry, 2 to 3 moist

Chroma: 2 to 4, dry or moist

Texture: sandy loam

Soil Survey of San Carlos Indian Reservation, Arizona

Cr horizon

Bedrock is soft granite

Coppercan soils

Taxonomic classification: Clayey, mixed, superactive, thermic, shallow Aridic

Argiustolls

Geomorphic position: generally occurs on summits and back slopes

Parent material: slope alluvium and/or residuum weathered from granite

Slope: 5 to 45 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 80 percent

woody debris: 60 percent

bare soil: 15 percent

rock fragments

gravel: 25 percent

Depth to restrictive feature(s): 10 to 20 inches to bedrock, paralithic

Drainage class: well drained

Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 2.8 (low)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Granitic Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB204AZ

Present vegetation: turbinella oak, banana yucca, manzanita, singleleaf pinyon, sumac, mountain mahogany, silktassel, juniper, mimosa

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: Typical pedon description is from Soil Survey of Eastern Pinal and Southern Gila Counties, Arizona; about 1,300 feet west and 2,350 feet north of the southeast corner of Section 20, Township 2 S, Range 15 E

Geographic Coordinate System:

33° 14' 42.80" north, 110° 49' 38.80" west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 4/3) clay loam, dark brown (7.5YR 3/3), moist; 38 percent clay; moderate medium platy parting to moderate fine subangular blocky structure; soft, very friable, moderately sticky and moderately plastic; many

Soil Survey of San Carlos Indian Reservation, Arizona

very fine roots; many very fine pores; 10 percent gravel; noneffervescent; neutral, pH 7.0; abrupt smooth boundary.

Bt1—2 to 9 inches (5 to 23 cm); reddish brown (5YR 4/3) clay, dark reddish brown (5YR 3/3), moist; 65 percent clay; strong fine and medium angular blocky structure; extremely hard, extremely firm, very sticky and very plastic; many very fine and few medium roots; many very fine pores; many continuous distinct clay films on faces of peds and rock fragments; 5 percent gravel; noneffervescent; neutral, pH 6.6; clear smooth boundary.

Bt2—9 to 18 inches (23 to 46 cm); reddish brown (5YR 4/4) clay, dark reddish brown (5YR 3/4), moist; 65 percent clay; strong fine and medium angular blocky structure; extremely hard, extremely firm, very sticky and very plastic; few medium roots; many very fine pores; many continuous distinct clay films on faces of peds and rock fragments; 5 percent gravel; noneffervescent; moderately acid, pH 6.0; abrupt wavy boundary.

Crt—18 to 60 inches (46 to 152 cm); many continuous distinct clay films along fractures of bedrock; weathered granite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 40 to 60 percent

Rock fragments: 5 to 15 percent

Effervescence: none

Reaction (pH): moderately acid to neutral (5.6 to 7.3)

A horizon

Hue: 7.5YR, 5YR

Value: 4 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: clay loam

Bt horizons

Hue: 5YR

Value: 4 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Texture: sandy clay, clay

Cr horizon

Bedrock is soft granite

90—Turquoise-Rock outcrop-Nugget complex, 20 to 70 percent slopes

Map Unit Setting

Landform(s): hills, mountains

Elevation: 4,000 to 6,200 feet (1,219 to 1,890 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Turquoise and similar soils: 40 percent
Rock outcrop: 30 percent
Nugget and similar soils: 20 percent
Minor components: Soils with greater than 35 percent clay content in the particle-size control section and soils that are greater than 20 inches deep to bedrock occur throughout the unit. Riverwash occurs in drainageways.

Soil Properties and Qualities

Turquoise soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, nonacid, thermic, shallow Aridic Ustorthents

Geomorphic position: generally on summits and steeper back slopes

Parent material: slope alluvium and/or residuum weathered from granite and/or granodiorite

Slope: 20 to 70 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 50 percent

woody debris: 0 percent

bare soil: 5 percent

rock fragments

gravel: 55 percent

cobble: 5 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, paralithic; 20 to 40 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 1.3 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Granitic Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB204AZ

Present vegetation: turbinella oak, shrubby buckwheat, mountain mahogany, desert ceanothus, annual grasses, perennial forbs, redberry buckthorn, redberry juniper, sotol, sacahuista

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,800 feet north and 2,280 feet west of southeast corner of Section 34, Township 02 S, Range 17 E

Geographic Coordinate System:

33° 12' 47.90" north, 110° 35' 40.00" west

A1—0 to 4 inches (0 to 10 cm); brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 3/3), moist; 10 percent clay; weak medium platy parting to weak fine granular structure; slightly hard, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 40 percent gravel; noneffervescent; neutral, pH 6.8; clear smooth boundary.

A2—4 to 18 inches (10 to 46 cm); brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 3/3), moist; 12 percent clay; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots; common very fine and fine pores; 50 percent gravel; noneffervescent; neutral, pH 7.0; clear wavy boundary.

Cr—18 to 33 inches (46 to 84 cm); weathered granite (grus) bedrock; clear wavy boundary.

R—33 to 60 inches (84 to 152 cm); unweathered granite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 15 percent

Rock fragments: 20 to 60 percent

Effervescence: none

Reaction: neutral (6.6 to 7.3)

A horizons

Hue: 5YR, 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: sandy loam

Cr horizon

Bedrock is soft to hard granite or granodiorite

Turquoise as used in this mapping unit is a taxadjunct to the series because the particle-size class is loamy-skeletal instead of loamy. Turquoise series is Loamy, mixed, superactive, nonacid, thermic, shallow Aridic Ustorthents.

Rock outcrop

Slope: 20 to 70 percent

Range in Characteristics

Rock outcrop consist of barren rock that occurs as ledges, massive boulder piles, and nearly vertical cliffs of granite. Rock outcrop also includes areas where the depth to bedrock is less than four inches. The higher percentage of rock outcrop is in areas near the summit of mountains.

Nugget soils

Taxonomic classification: Loamy, mixed, superactive, thermic, shallow Aridic

Argiustolls

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Geomorphic position: generally on less sloping areas and foot slopes

Parent material: granite and/or granodiorite

Slope: 20 to 45 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 50 percent

woody debris: 0 percent

bare soil: 5 percent

rock fragments

gravel: 45 percent

cobble: 10 percent

stone: 5 percent

Depth to restrictive feature(s): 10 to 20 inches to bedrock, paralithic; 20 to 40 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.06 inches per hour (0.00 to 0.42 micrometers per second)

Available water capacity total inches: 1.3 (very low)

Shrink-swell potential: about 4.0 LEP (moderate)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Granitic Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB204AZ

Present vegetation: turbinella oak, shrubby buckwheat, mountain mahogany, desert ceanothus, annual grasses, perennial forbs, redberry buckthorn, redberry juniper, sotol, sacahuista

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 720 feet north and 850 feet east of southwest corner of Section 27, Township 02S, Range 17E

Geographic Coordinate System:

33° 13' 29.30" north, 110° 36' 5.40" west

A—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/3) gravelly sandy loam, dark brown (7.5YR 3/3), moist; 15 percent clay; weak medium platy parting to weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; common very fine and fine pores; 25 percent gravel and 5 percent cobble; noneffervescent; slightly acid, pH 6.1; clear smooth boundary.

Bt—2 to 12 inches (5 to 30 cm); brown (7.5YR 4/2) gravelly sandy clay loam, dark brown (7.5YR 3/2), moist; 25 percent clay; moderate medium subangular blocky

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structure; hard, friable, slightly sticky and slightly plastic; many very fine and fine and common medium and coarse roots; common very fine and fine and few medium pores; few distinct clay films on faces of peds and rock fragments; 25 percent gravel and 5 percent cobble; noneffervescent; neutral, pH 6.6; clear wavy boundary.

Cr—12 to 30 inches (30 to 76 cm); weathered granite (grus) bedrock; clear wavy boundary.

R—30 to 60 inches (76 to 152 cm); unweathered granite bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 18 to 25 percent

Rock fragments: 20 to 35 percent

Organic matter: 1 to 3 percent

Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

A horizon

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 2 to 4, dry or moist

Texture: sandy loam, fine sandy loam

Rock fragments: 15 to 35 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 4 dry, 3 moist

Chroma: 2 to 3, dry or moist

Texture: sandy clay loam, sandy loam

Rock fragments: 15 to 35 percent

Cr horizon

Bedrock is soft to hard granite or granodiorite

91—Typic Fluvaquents, Wetrock soils, and Water, 0 to 3 percent slopes

Map Unit Setting

Landform(s): flood plains

Elevation: 1,750 to 2,300 feet (533 to 701 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 64 to 70 degrees F (17.8 to 21.1 degrees C)

Mean annual soil temperature: 66 to 72 degrees F (18.9 to 22.2 degrees C)

Frost-free period: 220 to 280 days

Major Land Resource Area: 40-Sonoran Basin and Range

Land Resource Unit: 40-1 Upper Sonoran Desert Shrub

Stream Segment Properties and Qualities

Segment length: about 28 miles of the Gila River from the San Carlos Reservoir Dam to the Ashurst-Hayden Dam in Florence, Arizona.

Active flood plain width: 40 to 300 feet

Stream flow: perennial; minimum: 95 cfs, maximum: 5,331 cfs, average: 3,278 cfs (Data from Kelvin crossing from 1,912 to 1999). Water is released regularly from the San Carlos reservoir to provide power and irrigation water.

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Flooding hazard: very frequent; very long (greater than or equal to 30 days)

Flood month: July-September and January-March

Water table minimum depth: 0 to 10 inches

Water table kind: apparent

Water table present: year round

Bank entrenchment:

percent cut: 90

percent uncut: 10

vertical cut: 5 to 20 feet; averages 6 to 8 feet

Depositional bar features: dynamic system of braided bars and channels that relocate with each major flood event; height varies with the depth and velocity of flood water.

Meander pattern: irregular meander

Channel composition:

percent bedrock: 2

percent cobbles: 18

percent gravel: 40

percent sand: 20

percent silt and clay: 20

Stability: dynamic system of braided components that generally degrades seasonally.

Map Unit Composition

Typic Fluvaquents and similar soils

Water

Wetrock and similar soils

Minor components: Gila and Glendale soils occur on slightly elevated positions above Queen creek soils. Fine textured Torrifluvents, Oxyaquic Torrifluvents and Fluvaquents soils with thick silty clay or silty clay loam surface textures occur on positions adjacent to Queen creek soils.

This is an undifferentiated map unit. These components are not consistently associated geographically. At least one component is present in every delineation, but each delineation can have any combination of the components. This map unit is not consistent over time. The components of this map unit consist of a dynamic system of braided bars and channels. The active stream dynamics will cause these components to shift locations. During severe rainfall events, the channel will cut and fill throughout its length.

Soil Properties and Qualities

Typic Fluvaquents soils

Taxonomic classification: Typic Fluvaquents

Geomorphic position: generally occurs on low benches adjacent to water

Parent material: mixed stream alluvium

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 10 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 50 percent

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woody debris: 5 percent

bare soil: 5 percent

rock fragments

gravel: 80 percent

Drainage class: poorly drained

Ksat solum: 0.20 to 39.69 inches per hour (1.40 to 280.00 micrometers per second)

Available water capacity total inches: 2.9 (low)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: very frequent

Seasonal water table minimum depth: about 0 to 20 inches

Runoff class: medium

Hydrologic group: D

Ecological site name: *Populus fremontii*-*Salix gooddingii*/*Sporobolus wrightii*

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F040XA125AZ

Present vegetation: tamarisk, willow, cottonwood, mesquite, annual forbs, sedges

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: Typical pedon description is from Soil Survey of Eastern Pinal and Southern Gila Counties, Arizona; about 700 feet south and 300 feet west of the northeast corner of Section 33, Township 4 S, Range 14 E

Geographic Coordinate System:

33° 2' 40.00" north, 110° 54' 50.00" west

C—0 to 2 inches (0 to 5 cm); brown (7.5YR 5/3) very gravelly coarse sand, brown (7.5YR 4/3), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; common fine roots; many fine pores; 45 percent gravel and 5 percent cobble; violently effervescent; slightly alkaline, pH 7.8; abrupt smooth boundary.

Cg1—2 to 5 inches (5 to 13 cm); 10 percent greenish black (5GY 2.5/1) and 90 percent dark brown (7.5YR 3/3) silty clay loam, 10 percent greenish black (5GY 2.5/1) and 90 percent dark brown (7.5YR 3/3), moist; 34 percent clay; moderate very fine and fine subangular blocky and weak very fine platy structure; soft, very friable, very sticky and very plastic; many very fine and fine roots; many fine pores; 25 percent fine strong brown (7.5YR 5/8) masses of oxidized iron and 25 percent fine strong brown (7.5YR 5/8) masses of oxidized iron lining pores; 5 percent gravel; violently effervescent; slightly alkaline, pH 7.8; abrupt smooth boundary.

Cg2—5 to 12 inches (13 to 30 cm); dark brown (7.5YR 3/2) fine sandy loam, dark brown (7.5YR 3/2), moist; 8 percent clay; massive; soft, very friable, moderately sticky and moderately plastic; many very fine and fine roots; many fine pores; 25 percent fine strong brown (7.5YR 5/8) masses of oxidized iron and 25 percent fine strong brown (7.5YR 5/8) masses of oxidized iron lining pores; 5 percent gravel; violently effervescent; slightly alkaline, pH 7.6; abrupt smooth boundary.

Cg3—12 to 60 inches (30 to 152 cm); brown (7.5YR 4/3) very gravelly coarse sand, brown (7.5YR 4/3), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; 45 percent gravel; violently effervescent; slightly alkaline, pH 7.6.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 5 to 40 percent

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Rock fragments: 0 to 20 percent
Calcium carbonate equivalent: 1 to 5 percent
Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

C horizon

Hue: 7.5YR, 10YR, 5BG
Value: 3 to 5 dry, 3 to 4 moist
Chroma: 3 to 4 dry, 1 to 3 moist
Texture: coarse sand, fine sand, fine sandy loam, silty clay loam, silt loam
Rock fragments: 0 to 60 percent

Cg horizons

Hue: 7.5YR, 10YR, 5B, 5GY, 10BG
Value: 2 to 5 moist
Chroma: 1 to 3 moist
Texture: coarse sand, sand with thin strata of sandy loam, fine sandy loam, silt loam, silty clay loam
Rock fragments: 0 to 60 percent

Water

Range in Characteristics

Water includes the Gila River

Wetrock soils

Taxonomic classification: Sandy-skeletal, mixed, thermic Oxyaquic Torrifluvents

Geomorphic position: generally occurs on higher benches farthest from the drainageway

Parent material: mixed sandy and gravelly alluvium

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent

Chemical crust

salt: 0 percent
gypsum: 0 percent

Physical cover

canopy plant cover: 40 percent
woody debris: 5 percent
bare soil: 5 percent
rock fragments
gravel: 60 percent
cobble: 20 percent

Drainage class: moderately well drained

Ksat solum: 19.98 to 39.69 inches per hour (141.00 to 280.00 micrometers per second)

Available water capacity total inches: 1.5 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: frequent

Seasonal water table minimum depth: about 20 to 40 inches

Runoff class: very low

Hydrologic group: A

Ecological site name: *Populus fremontii*-*Salix gooddingii*/*Sporobolus wrightii*

Other ecological sites may occur in this map unit and vary in extent between

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delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F040XA125AZ

Present vegetation: tamarisk, willow, cottonwood, mesquite, other grasslikes

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: Typical pedon description is from Soil Survey of Eastern Pinal and Southern Gila Counties, Arizona; about 900 feet south and 200 feet west of the northeast corner of Section 33, Township 4 S, Range 14 E

Geographic Coordinate System:

33° 2' 42.00" north, 110° 54' 51.00" west

C1—0 to 10 inches (0 to 25 cm); brown (7.5YR 5/3) extremely gravelly coarse sand, dark brown (7.5YR 3/3), moist; 3 percent clay; single grain; loose, nonsticky and nonplastic; many very fine and fine roots; many fine pores; 75 percent gravel and 10 percent cobble; strongly effervescent; moderately alkaline, pH 8.0; abrupt smooth boundary.

C2—10 to 20 inches (25 to 51 cm); brown (7.5YR 5/2) gravelly coarse sand, dark brown (7.5YR 3/4), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; many very fine and fine and common medium roots; many fine pores; 10 percent brown (7.5YR 5/2) and dark greenish gray (5BG 3/1) clay depletions; 20 percent gravel and 5 percent cobble; strongly effervescent; slightly alkaline, pH 7.6; abrupt smooth boundary.

C3—20 to 37 inches (51 to 94 cm); brown (7.5YR 5/2) extremely gravelly coarse sand, brown (7.5YR 4/4), moist; 2 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and fine roots; many fine pores; 1 percent distinct strong brown (7.5YR 5/8) masses of oxidized iron lining pores; 65 percent gravel and 15 percent cobble; strongly effervescent; slightly alkaline, pH 7.8; clear smooth boundary.

C4—37 to 60 inches (94 to 152 cm); brown (7.5YR 4/2) extremely cobbly coarse sand, dark brown (7.5YR 3/2), moist; 1 percent clay; single grain; loose, nonsticky and nonplastic; 30 percent gravel and 40 percent cobble; neutral, pH 7.2.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 1 to 5 percent

Rock fragments: 35 to 80 percent

Rock fragments: 35 to 80 percent

Calcium carbonate equivalent: 1 to 3 percent

Reaction (pH): neutral to moderately alkaline (6.6 to 8.4)

C1 horizon

Hue: 7.5YR, 10YR

Value: 5 to 6 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Texture: coarse sand, fine sand, silt loam, very fine sandy loam

Lower C horizons

Hue: 7.5YR, 10YR

Value: 4 to 5 dry, 3 to 5 moist

Chroma: 2 to 4, dry or moist

Texture: coarse sand, sand, with thin strata of silt loam, silty clay loam

Redoximorphic features: common to many redox concentrations occurring as masses and linings along root channels (7.5YR 5/8, 7.5YR 6/2) and few to common redox depletions (5BG 3/1, 10BG 3/1, 5B 3/1 10B 3/1); usually occur in strata finer than loamy fine sand

92—Urban land-Agustin-Glendale complex, 1 to 5 percent slopes

Map Unit Setting

Landform(s): alluvial fans, flood plains

Elevation: 2,500 to 3,600 feet (762 to 1,097 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 60 to 67 degrees F (15.6 to 19.4 degrees C)

Mean annual soil temperature: 62 to 69 degrees F (16.7 to 20.5 degrees C)

Frost-free period: 190 to 250 days

Major Land Resource Area: 41-Southeastern Arizona Basin and Range

Land Resource Unit: 41-2 Chihuahuan-Sonoran Desert Shrub Mix

Map Unit Composition

Urban land: 45 percent

Agustin and similar soils: 25 percent

Glendale and similar soils: 20 percent

Minor components: Torriorthents soils occur on small higher back slopes. Torrifluvents soils and Riverwash occur in drainageways.

Soil Properties and Qualities

Urban land

Slope: 1 to 5 percent

Range in Characteristics

Urban land consists of areas of soil so altered by construction or obscured by structures and pavement that identification of the soil is difficult or impossible. In general, the underlying and interspersed soil material has many of the characteristics of the associated soils in this unit.

Agustin soils

Taxonomic classification: Coarse-loamy, mixed, superactive, thermic Typic Haplocambids

Geomorphic position: generally occurs on toe slopes below fan terrace sediments

Parent material: mixed coarse-loamy alluvium

Slope: 1 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 85 percent

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woody debris: 2 percent
bare soil: 10 percent
rock fragments
 fine gravel: 2 percent
 medium gravel: 2 percent
 coarse gravel: 1 percent
Drainage class: well drained
Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)
Available water capacity total inches: 8.6 (high)
Shrink-swell potential: about 1.5 LEP (low)
Flooding hazard: very rare
Runoff class: very low
Hydrologic group: A
Ecological site name: Limy Fan 8-12" p.z.
Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.
Ecological site number: R041XB206AZ
Present vegetation: creosote bush, catclaw acacia, annual grasses, annual forbs
Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 750 feet north and 1,850 feet east of southwest corner of Section 12, Township 1 S, Range 18 E

Geographic Coordinate System:

33° 21' 28.80" north, 110° 27' 44.30" west

A—0 to 8 inches (0 to 20 cm); brown (7.5YR 5/3) sandy loam, dark brown (7.5YR 3/3), moist; 10 percent clay; weak medium and coarse subangular blocky parting to weak very fine and fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine pores; 2 percent gravel; violently effervescent; moderately alkaline, pH 8.4; clear wavy boundary.

Bk1—8 to 40 inches (20 to 102 cm); brown (7.5YR 5/4) gravelly sandy loam, brown (7.5YR 4/4), moist; 8 percent clay; massive; soft, loose, nonsticky and nonplastic; many very fine roots; many very fine pores; few distinct carbonate coats on bottom surfaces of rock fragments; 15 percent gravel; violently effervescent, 9 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; clear wavy boundary.

Bk2—40 to 70 inches (102 to 178 cm); brown (7.5YR 5/4) fine sandy loam, brown (7.5YR 4/4), moist; 10 percent clay; massive; soft, loose, nonsticky and nonplastic; common very fine roots; many very fine pores; few distinct carbonate coats on rock fragments; common medium carbonate masses on surfaces along root channels; 5 percent gravel; violently effervescent, 9 percent calcium carbonate equivalent; moderately alkaline, pH 8.4.

Range in Characteristics

Particle-size control section (weighted average)

 Clay content: 5 to 18 percent

 Rock fragments: 2 to 25 percent

Gypsum: 0 to 5 percent

Calcium carbonate equivalent: 1 to 9 percent

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A horizon

Hue: 7.5YR, 10YR
Value: 3 to 6 dry, 3 to 4 moist
Chroma: 3 to 4, dry or moist
Texture: coarse sand, sandy loam, loam
Rock fragments: 2 to 25 percent
Effervescence: none to violent
Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

Bk horizons

Hue: 7.5YR, 10YR
Value: 3 to 5 dry, 3 to 4 moist
Chroma: 3 to 4, dry or moist
Texture: sandy loam, fine sandy loam, loam
Rock fragments: 2 to 25 percent
Effervescence: strong to violent
Reaction (pH): moderately alkaline to strongly alkaline (7.9 to 9.0)

Glendale soils

Taxonomic classification: Fine-silty, mixed, superactive, calcareous, thermic Typic Torrifluvents

Geomorphic position: generally occurs on high flood plain benches

Parent material: mixed fine-silty alluvium

Slope: 1 to 5 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent
lichen: 0 percent
moss: 0 percent

Chemical crust

salt: 0 percent
gypsum: 0 percent

Physical cover

canopy plant cover: 90 percent
woody debris: 0 percent
bare soil: 15 percent
rock fragments
fine gravel: 10 percent
medium gravel: 15 percent
coarse gravel: 5 percent

Drainage class: well drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Available water capacity total inches: 10.8 (very high)

Shrink-swell potential: about 4.5 LEP (moderate)

Flooding hazard: very rare

Runoff class: low

Hydrologic group: C

Ecological site name: Prosopis glandulosa var. torreyana-Prosopis velutina/
Sporobolus wrightii

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F041XB221AZ

Present vegetation: catclaw acacia, common Mediterranean grass, foxtail barley, red brome, redstem filaree, velvet mesquite

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Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 300 feet north and 2,500 feet west of southeast corner of Section 11, Township 1 S, Range 18 E

Geographic Coordinate System:

33° 21' 14.90" north, 110° 28' 29.20" west

A—0 to 2 inches (0 to 5 cm); brown (10YR 5/3) silt loam, brown (10YR 4/3), moist; 25 percent clay; weak medium platy structure; soft, very friable, very sticky and very plastic; many very fine roots; many very fine pores; 10 percent gravel; violently effervescent, 6 percent calcium carbonate equivalent; moderately alkaline, pH 8.4; abrupt wavy boundary.

C1—2 to 30 inches (5 to 76 cm); brown (10YR 5/3) and brown (10YR 4/3) silty clay loam, brown (10YR 4/3), moist; 35 percent clay; weak medium and coarse subangular blocky structure; very hard, very firm, very sticky and very plastic; many very fine roots; many very fine pores; 2 percent gravel; violently effervescent, 7 percent calcium carbonate equivalent; moderately alkaline, pH 8.2; abrupt wavy boundary.

C2—30 to 38 inches (76 to 97 cm); yellowish brown (10YR 5/4) silt loam, brown (10YR 4/3), moist; 15 percent clay; weak medium and coarse subangular blocky structure; soft, very friable, very sticky and moderately plastic; few very fine roots; many very fine and fine pores; 2 percent gravel; violently effervescent, 7 percent calcium carbonate equivalent; slightly alkaline, pH 7.8; abrupt wavy boundary.

C3—38 to 41 inches (97 to 104 cm); yellowish brown (10YR 5/4) coarse sandy loam, brown (10YR 4/3), moist; 5 percent clay; single grain; loose, nonsticky and nonplastic; few very fine roots; many very fine and fine pores; 5 percent gravel; violently effervescent, 7 percent calcium carbonate equivalent; slightly alkaline, pH 7.6; abrupt wavy boundary.

C4—41 to 60 inches (104 to 152 cm); yellowish brown (10YR 5/4) silt loam, brown (10YR 4/3), moist; 25 percent clay; weak medium and coarse subangular blocky structure; soft, very friable, very sticky and very plastic; few very fine roots; many very fine pores; 2 percent gravel; violently effervescent, 7 percent calcium carbonate equivalent; moderately alkaline, pH 8.0.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 18 to 35 percent

Rock fragments: 2 to 10 percent

Gypsum: 0 to 2 percent

Calcium carbonate equivalent: 1 to 7 percent

Effervescence: slight to violent

Reaction (pH): slightly to moderately alkaline (7.4 to 8.4)

A horizon

Hue: 7.5YR, 10YR

Value: 4 to 6, dry or moist

Chroma: 3 to 4 dry, 2 to 3 moist

Texture: sandy loam, fine sandy loam, silt loam, silty clay loam

Rock fragments: 5 to 10 percent

Ck horizons

Hue: 7.5YR, 10YR

Value: 4 to 6, dry or moist
Chroma: 3 to 4, dry or moist
Texture: silt loam, silty clay loam, with strata of coarser or finer textures
Rock fragments: 0 to 5 percent

93—Urban land-Topawa complex, 1 to 30 percent slopes

Map Unit Setting

Landform(s): fan terraces
Elevation: 2,500 to 3,600 feet (762 to 1,097 meters)
Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)
Mean annual air temperature: 60 to 67 degrees F (15.6 to 19.4 degrees C)
Mean annual soil temperature: 62 to 69 degrees F (16.7 to 20.5 degrees C)
Frost-free period: 190 to 250 days
Major Land Resource Area: 41-Southeastern Arizona Basin and Range
Land Resource Unit: 41-2 Chihuahuan-Sonoran Desert Shrub Mix

Map Unit Composition

Urban land: 55 percent
Topawa and similar soils: 40 percent
Minor components: Eba soils occur on similar positions as Topawa. Stagecoach and Torriorthents soils occur in eroded areas.

Soil Properties and Qualities

Urban land

Slope: 1 to 3 percent

Range in Characteristics

Urban land consists of areas of soil so altered by construction or obscured by structures and pavement that identification of the soil is difficult or impossible. In general, the underlying and interspersed soil material has many of the characteristics of the associated soils in this unit.

Topawa soils

Taxonomic classification: Clayey-skeletal, mixed, superactive, thermic Typic Haplargids

Geomorphic position: generally occurs on summits and back slopes

Parent material: mixed clayey-skeletal alluvium

Slope: 1 to 30 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 90 percent

woody debris: 2 percent

bare soil: 5 percent

rock fragments

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fine gravel: 20 percent
medium gravel: 10 percent
coarse gravel: 10 percent
cobble: 15 percent
stone: 5 percent

Drainage class: well drained

Ksat solum: 0.06 to 0.57 inches per hour (0.42 to 4.00 micrometers per second)

Available water capacity total inches: 3.7 (low)

Shrink-swell potential: about 7.5 LEP (high)

Flooding hazard: none

Runoff class: medium

Hydrologic group: C

Ecological site name: Clay Loam Upland 8-12" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R041XB204AZ

Present vegetation: red brome, curly mesquite, Rothrock's grama, catclaw acacia, sixweeks fescue, snakeweed, western ragweed, redstem filaree, mesquite, pricklypear, globemallow, wolfberry

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 850 feet west and 400 feet north of southeast corner of Section 1, Township 1 S, Range 18 E

Geographic Coordinate System:

33° 22' 9.10" north, 110° 27' 11.60" west

A—0 to 4 inches (0 to 10 cm); brown (7.5YR 4/4) very cobbly clay loam, dark brown (7.5YR 3/4), moist; 30 percent clay; moderate fine and medium granular structure; soft, loose, moderately sticky and moderately plastic; many very fine roots; many very fine pores; 25 percent gravel and 15 percent cobble and 5 percent stone; noneffervescent; slightly alkaline, pH 7.4; clear wavy boundary.

Bt—4 to 20 inches (10 to 51 cm); reddish brown (5YR 4/4) very cobbly clay, red (2.5YR 4/6), moist; 45 percent clay; weak medium and coarse subangular blocky structure; hard, firm, very sticky and very plastic; many very fine and fine and common medium roots; common very fine pores; common distinct pressure faces; few distinct clay films on rock fragments; 25 percent gravel and 15 percent cobble and 10 percent stone; strongly effervescent; slightly alkaline, pH 7.6; clear wavy boundary.

Btk—20 to 60 inches (51 to 152 cm); strong brown (7.5YR 4/6) extremely cobbly clay, strong brown (7.5YR 4/6), moist; 40 percent clay; strong fine and medium subangular blocky structure; slightly hard, very firm, very sticky and very plastic; common very fine roots; many very fine pores; few distinct clay films on rock fragments; many carbonate concretions around rock fragments; 40 percent gravel and 15 percent cobble and 10 percent stone; violently effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 40 to 55 percent

Rock fragments: 35 to 60 percent

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A horizon

Hue: 5YR, 7.5YR

Value: 4 to 5 dry, 3 to 4 moist

Chroma: 3 to 4, dry or moist

Texture: clay loam, sandy clay loam

Rock fragments: 35 to 50 percent

Gypsum: 0 to 1 percent

Effervescence: none

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Bt horizons

Hue: 2.5YR, 5YR, 7.5YR

Value: 3 to 4, dry or moist

Chroma: 3 to 6, dry or moist

Texture: sandy clay, clay

Rock fragments: 35 to 60 percent

Effervescence: none to strong

Reaction (pH): neutral to slightly alkaline (6.6 to 7.8)

Btk horizons

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2 to 4 moist

Chroma: 3 to 6, dry or moist

Texture: clay, sandy clay loam

Rock fragments: 45 to 65 percent

Effervescence: strong to violent

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

Topawa as used in this mapping unit is a taxadjunct to the series because the particle-size class is clayey-skeletal instead of loamy-skeletal. Topawa series is Loamy-skeletal, mixed, superactive, thermic Typic Haplargids.

94—Ustifluvents soils, Riverwash, Rock outcrop, and Water, 0 to 2 percent slopes

Map Unit Setting

Landform(s): flood plains

Elevation: 3,400 to 5,000 feet (1,036 to 1,524 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral- Woodlands

Stream Segment Properties and Qualities

Segment length: about 54 miles of the lower Black River and Salt River flowing west to survey boundary.

Active flood plain width: 100 to 1,400 feet

Stream flow: perennial

Flooding hazard: frequent; long (7 to 30 days)

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Flood month: December-March and July-September

Water table minimum depth: 0 to 20 inches

Water table kind: apparent

Water table present: year round

Bank entrenchment:

percent cut: 30

percent uncut: 70

vertical cut: 1 to 10 feet; averages 3 to 5 feet

Depositional bar features: dynamic system of braided bars and channels that relocate with each major flood event; height varies with the depth and velocity of flood water.

Meander pattern: irregular meander

Channel composition:

percent bedrock: 20

percent boulders: 3

percent stones: 12

percent cobbles: 23

percent gravel: 22

percent sand: 15

percent silt and clay: 5

Stability: dynamic system of braided components that generally degrades seasonally.

Map Unit Composition

Ustifluvents and similar soils

Riverwash

Rock outcrop

Water

Minor components: Stanford soils occur on higher benches. Fine textured soils occur on higher foot slopes.

This is an undifferentiated map unit. These components are not consistently associated geographically. At least one component is present in every delineation, but each delineation can have any combination of the components. This map unit is not consistent over time. The components of this map unit consist of a dynamic system of braided bars and channels. The active stream dynamics will cause these components to shift locations. During severe rainfall events, the channel will cut and fill throughout its length.

Soil Properties and Qualities

Ustifluvents soils

Taxonomic classification: Ustifluvents

Geomorphic position: generally occurs on high benches

Parent material: mixed sandy and gravelly alluvium

Slope: 0 to 2 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

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Physical cover

canopy plant cover: 60 percent

woody debris: 0 percent

bare soil: 50 percent

rock fragments

gravel: 4 percent

cobble: 1 percent

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Available water capacity total inches: 3.3 (low)

Shrink-swell potential: about 2.0 LEP (low)

Flooding hazard: occasional

Runoff class: very low

Hydrologic group: A

Ecological site name: Platanus wrightii-Populus fremontii/Muhlenbergia rigens

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F038XB228AZ

Present vegetation: Arizona black walnut, Arizona sycamore, algerita, blue grama, catclaw acacia, desert willow, mesquite, oneseed juniper, pricklypear, sand dropseed, sideoats grama, snakeweed

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 1,300 feet south and 1,600 feet east of northwest corner of Section 12, Township 4 N, Range 20 E

Geographic Coordinate System:

33° 42' 33.60" north, 110° 12' 54.40" west

A—0 to 8 inches (0 to 20 cm); brown (7.5YR 5/2) loam, dark brown (7.5YR 3/2), moist; 15 percent clay; weak thick platy parting to weak fine granular structure; soft, very friable, nonsticky and nonplastic; common very fine and fine and common medium and coarse roots; common very fine and fine and common medium and coarse pores; 5 percent gravel; strongly effervescent; slightly alkaline, pH 7.6; abrupt wavy boundary.

C—8 to 60 inches (20 to 152 cm); brown (7.5YR 5/2) stratified extremely cobbly coarse sandy loam, dark brown (7.5YR 3/2), moist; 10 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and fine and common medium and coarse roots; many very fine and fine and many medium and coarse pores; 35 percent gravel and 30 percent cobble and 5 percent stone; strongly effervescent; slightly alkaline, pH 7.8.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 4 to 22 percent

Rock fragments: 10 to 80 percent

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

A horizon

Hue: 7.5YR

Value: 5 dry, 3 to 4 moist

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Chroma: 2 to 3, dry or moist
Texture: loamy coarse sand, loam
Rock fragments: 5 to 90 percent
Effervescence: none to strong

C horizons

Hue: 7.5YR
Value: 4 to 5 dry, 3 to 4 moist
Chroma: 2 to 4, dry or moist
Texture: stratified sand to loam
Rock fragments: 5 to 80 percent
Effervescence: slight to violent

Riverwash

Slope: 0 to 2 percent

Range in Characteristics

Riverwash consists of stratified sands, gravels, and cobbles from numerous sources. This material is part of a dynamic system of braided bars and channels. This material is not stable and is subject to shifting and sorting. It is usually dry but can be transformed into a temporary water course or a short-lived torrent after a heavy rain within the watershed. In very wet years, surface water can cover Riverwash for part of the year. Riverwash does not usually support vegetation because the material is constantly shifted and scoured.

Rock outcrop

Slope: 0 to 2 percent

Range in Characteristics

Rock outcrop consist of barren rock that occurs as ledges of igneous, metamorphic, and sedimentary rock in and along the river channel. Rock outcrop also includes areas where the depth to bedrock is less than four inches.

Water

Range in Characteristics

Water includes the perennial flow of the Salt River and lower Black River.

95—Water

Map Unit Setting

Landform(s): lakes and ponds
Elevation: 2,500 to 7,200 feet (762 to 2,195 meters)
Mean annual precipitation: 10 to 24 inches (254 to 610 millimeters)
Mean annual air temperature: 45 to 67 degrees F (7.0 to 19.4 degrees C)
Mean annual soil temperature: 47 to 69 degrees F (8.1 to 20.5 degrees C)
Frost-free period: 120 to 250 days

Map Unit Composition

Water: 100 percent

Range in Characteristics

Includes larger bodies of water throughout the San Carlos Reservation, such as Lake San Carlos, Point of Pines Lake, Dry Lake, and Talkalai Lake.

96—Wetrock, Vinton, and Typic Fluvaquents soils, and Water, 0 to 3 percent slopes

Map Unit Setting

Landform(s): flood plains

Elevation: 2,500 to 3,600 feet (762 to 1,097 meters)

Mean annual precipitation: 10 to 12 inches (254 to 305 millimeters)

Mean annual air temperature: 60 to 67 degrees F (15.6 to 19.4 degrees C)

Mean annual soil temperature: 62 to 69 degrees F (16.7 to 20.5 degrees C)

Frost-free period: 190 to 250 days

Major Land Resource Area: 41-Southeastern Arizona Basin and Range

Land Resource Unit: 41-2 Chihuahuan-Sonoran Desert Shrub Mix

Stream Segment Properties and Qualities

Segment length: about 20 miles of the Gila River starting from the eastern survey boundary and flowing west to the confluence with San Carlos Reservoir.

Active flood plain width: 1,000 to 4,000 feet

Stream flow: perennial

Flooding hazard: frequent; long (7 to 30 days)

Flood month: March-April and July-September

Water table minimum depth: 0 to 20 inches

Water table kind: apparent

Water table present: year round

Bank entrenchment:

percent cut: 80

percent uncut: 20

vertical cut: 3 to 20 feet; averages 5 to 10 feet

Depositional bar features: dynamic system of braided bars and channels that relocate with each major flood event; height varies with the depth and velocity of flood water.

Meander pattern: irregular meander

Channel composition:

percent cobbles: 18

percent gravel: 40

percent sand: 22rock fragments

percent silt and clay: 20

Stability: dynamic system of braided components that aggrades and degrades seasonally.

Map Unit Composition

Wetrock and similar soils

Vinton and similar soils

Typic Fluvaquents and similar soils

Water

Minor components: Fine textured soils occur in slack water areas, especially closer to San Carlos Reservoir. Gila soils occur on higher benches away from the channel. Riverwash occurs in the main river channel.

This is an undifferentiated map unit. These components are not consistently associated geographically. At least one component is present in every delineation, but each delineation can have any combination of the components. This map unit is not consistent over time. The components of this map unit consist of a dynamic

system of braided bars and channels. The active stream dynamics will cause these components to shift locations. During severe rainfall events, the channel will cut and fill throughout its length.

Soil Properties and Qualities

Wetrock soils

Taxonomic classification: Sandy-skeletal, mixed, thermic Oxyaquic Torrifuvents

Geomorphic position: generally occurs on lower benches

Parent material: mixed sandy and gravelly alluvium

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 1 percent

woody debris: 1 percent

bare soil: 2 percent

rock fragments

gravel: 95 percent

cobble: 1 percent

Drainage class: moderately well drained

Ksat solum: 19.98 to 39.69 inches per hour (141.00 to 280.00 micrometers per second)

Available water capacity total inches: 1.8 (very low)

Shrink-swell potential: about 0.5 LEP (low)

Flooding hazard: frequent

Seasonal water table minimum depth: about 25 to 40 inches

Runoff class: very low

Hydrologic group: A

Ecological site name: Populus fremontii-Salix gooddingii/Sporobolus wrightii

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F041XB218AZ

Present vegetation: Fremont cottonwood, Gooding willow, perennial grasses, seepwillow baccharis, saltcedar tamarisk, annual grasses

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 2,400 feet east and 300 feet south of northwest corner of Section 4, Township 4 S, Range 22 E

Geographic Coordinate System:

33° 7' 14.80" north, 110° 5' 43.10" west

C1—0 to 7 inches (0 to 18 cm); brown (7.5YR 4/3) very gravelly coarse sand, brown (7.5YR 4/2), moist; 5 percent clay; single grain; loose, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 50 percent gravel; strongly effervescent; moderately alkaline, pH 8.2; clear wavy boundary.

Soil Survey of San Carlos Indian Reservation, Arizona

C2—7 to 11 inches (18 to 28 cm); brown (7.5YR 4/3) very gravelly coarse sand, brown (7.5YR 4/2), moist; 5 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine pores; 35 percent gravel and 5 percent cobble; noneffervescent; moderately alkaline, pH 8.2; clear wavy boundary.

C3—11 to 60 inches (28 to 152 cm); brown (7.5YR 4/3) stratified very gravelly coarse sand, brown (7.5YR 4/2), moist; 5 percent clay; single grain; loose, nonsticky and nonplastic; few very fine and fine roots; many very fine and fine and common medium pores; 55 percent gravel and 3 percent cobble; noneffervescent; moderately alkaline, pH 8.2.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: less than 10 percent

Rock fragments: 35 to 70 percent

Effervescence: none to strong

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

C1 horizon

Hue: 7.5YR

Value: 4 or 5 dry, 3 or 4 moist

Chroma: 2 or 3, dry or moist

Texture: sand, coarse sand, sandy loam

Rock fragments: 20 to 70 percent

C2 and C3 horizons

Hue: 7.5YR

Value: 4 or 5 dry, 3 or 4 moist

Chroma: 2 or 3, dry or moist

Texture: coarse sand with strata of coarser or finer textures

Rock fragments: 35 to 70 percent

Some pedons may have a silty cap on surface horizon.

Vinton soils

Taxonomic classification: Sandy, mixed, thermic Typic Torrifuvents

Geomorphic position: generally occurs on higher benches

Parent material: mixed sandy alluvium

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 75 percent

woody debris: 5 percent

bare soil: 20 percent

rock fragments

gravel: 5 percent

Drainage class: somewhat excessively drained

Ksat solum: 1.98 to 19.98 inches per hour (14.00 to 141.00 micrometers per second)

Soil Survey of San Carlos Indian Reservation, Arizona

Available water capacity total inches: 5.5 (moderate)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: occasional

Seasonal water table minimum depth: about 80 to 120 inches

Runoff class: very low

Hydrologic group: A

Ecological site name: *Populus fremontii*-*Salix gooddingii*/*Sporobolus wrightii*

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F041XB218AZ

Present vegetation: Fremont cottonwood, Gooding willow, perennial grasses, seepwillow baccharis, saltcedar tamarisk, annual grasses

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 2,400 feet east and 600 feet south of northwest corner of Section 4, Township 4 S, Range 22 E

Geographic Coordinate System:

33° 7' 13.70" north, 110° 5' 43.30" west

C1—0 to 1 inch (0 to 3 cm); brown (7.5YR 5/3) loamy fine sand, dark brown (7.5YR 3/2), moist; 7 percent clay; weak medium platy parting to single grain structure; loose, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 1 percent gravel; slightly effervescent; slightly alkaline, pH 7.8; clear wavy boundary.

C2—1 to 20 inches (3 to 51 cm); brown (7.5YR 5/3) stratified fine sand, brown (7.5YR 4/2), moist; 5 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine pores; 1 percent gravel; very slightly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C3—20 to 28 inches (51 to 71 cm); brown (7.5YR 5/3) stratified very fine sandy loam, dark brown (7.5YR 3/3), moist; 13 percent clay; single grain; loose, nonsticky and nonplastic; common very fine and fine roots; many very fine and fine pores; 1 percent gravel; slightly effervescent; moderately alkaline, pH 8.2; abrupt smooth boundary.

C4—28 to 60 inches (71 to 152 cm); brown (7.5YR 5/3) stratified loamy fine sand, dark brown (7.5YR 3/2), moist; 6 percent clay; single grain; loose, nonsticky and nonplastic; many very fine and fine and common medium roots; many very fine and fine pores; 1 percent gravel; slightly effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: less than 10 percent

Rock fragments: less than 15 percent

Effervescence: none to strong

Reaction (pH): slightly alkaline to moderately alkaline (7.4 to 8.4)

C1 horizon

Hue: 7.5YR

Value: 5 dry, 3 or 4 moist

Chroma: 2 or 3, dry or moist

Texture: very fine loamy sand, loamy fine sand, fine sand, sand

Rock fragments: 0 to 10 percent

Soil Survey of San Carlos Indian Reservation, Arizona

C2, C3, and C4 horizons

Hue: 7.5YR

Value: 5 dry, 3 or 4 moist

Chroma: 2 or 3, dry or moist

Texture: coarse sand, sand, fine sand, very fine sand, loamy fine sand, loamy sand, very fine sandy loam with strata of coarser or finer textures

Rock fragments: 0 to 15 percent

Some pedons may have a silty cap on the surface horizon.

Typic Fluvaquents soils

Taxonomic classification: Typic Fluvaquents

Geomorphic position: generally occurs on lowest benches adjacent to water

Parent material: mixed sandy and gravelly alluvium

Slope: 0 to 3 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 80 percent

woody debris: 10 percent

bare soil: 5 percent

rock fragments

gravel: 5 percent

Drainage class: poorly drained

Ksat solum: 0.20 to 19.98 inches per hour (1.40 to 141.00 micrometers per second)

Available water capacity total inches: 4.8 (low)

Shrink-swell potential: about 5.0 LEP (moderate)

Flooding hazard: frequent

Seasonal water table minimum depth: about 0 to 20 inches

Runoff class: medium

Hydrologic group: D

Ecological site name: Populus fremontii-Salix gooddingii/Sporobolus wrightii

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: F041XB218AZ

Present vegetation: Fremont cottonwood, Gooding willow, perennial grasses, seepwillow baccharis, saltcedar tamarisk, annual grasses

Land capability (non irrigated): 7c

Typical Profile

Location

Public Land Survey: 160 feet north and 2,600 feet west of southeast corner of Section 33, Township 3 S, Range 22 E

Geographic Coordinate System:

33° 7' 16.90" north, 110° 5' 42.40" west

C1—0 to 5 inches (0 to 13 cm); pinkish gray (7.5YR 6/2) clay loam, dark brown (7.5YR 3/2), moist; 38 percent clay; moderate fine and medium subangular blocky

structure; slightly hard, very friable, moderately sticky and moderately plastic; many very fine, fine, medium and coarse roots; many very fine and fine pores; 2 percent gravel; strongly effervescent; strongly alkaline, pH 8.5; abrupt wavy boundary.

C2—5 to 9 inches (13 to 23 cm); brown (7.5YR 5/2) sand, dark grayish brown (10YR 4/2), moist; 5 percent clay; single grain; soft, loose, nonsticky and nonplastic; common very fine and fine and many medium and coarse roots; many very fine and fine pores; 5 percent gravel; slightly effervescent; strongly alkaline, pH 8.5; very abrupt wavy boundary.

C3—9 to 60 inches (23 to 152 cm); pinkish gray (7.5YR 6/2) stratified loamy sand, dark grayish brown (10YR 4/2), moist; 10 percent clay; massive; soft, very friable, moderately sticky and moderately plastic; many very fine, fine, medium, and coarse and common very coarse roots; many very fine and fine pores; 5 percent fine and medium faint dark yellowish brown (10YR 4/4), moist, masses of oxidized iron; 2 percent gravel; strongly effervescent; moderately alkaline, pH 8.2.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: less than 10 percent

Rock fragments: less than 15 percent

Effervescence: slight to strong

Reaction (pH): slightly alkaline to strongly alkaline (7.4 to 9.0)

C1 horizon

Hue: 7.5YR, 10YR

Value: 5 or 6 dry, 3 or 4 moist

Chroma: 2 or 3, dry or moist

Texture: clay, clay loam, coarse sand

Rock fragments: 1 to 35 percent

C2 and C3 horizons

Hue: 7.5YR, 10YR

Value: 5 or 6 dry, 3 or 4 moist

Chroma: 2 or 3, dry or moist

Texture: coarse sand, sand, loamy sand, sandy loam with strata of coarser or finer textures

Rock fragments: 1 to 15 percent

Some pedons may have a silty cap on surface horizon.

Water

Range in Characteristics

Water includes the Gila River.

97—Woodcutter-Budlamp-Rock outcrop complex, 15 to 60 percent slopes

Map Unit Setting

Landform(s): mountains

Elevation: 4,000 to 6,600 feet (1,219 to 2,012 meters)

Mean annual precipitation: 16 to 20 inches (406 to 508 millimeters)

Mean annual air temperature: 57 to 62 degrees F (13.9 to 16.7 degrees C)

Mean annual soil temperature: 59 to 64 degrees F (15.0 to 17.8 degrees C)

Soil Survey of San Carlos Indian Reservation, Arizona

Frost-free period: 160 to 210 days

Major Land Resource Area: 38-Mogollon Transition

Land Resource Unit: 38-2 Interior Chaparral-Woodlands

Map Unit Composition

Woodcutter and similar soils: 40 percent

Budlamp and similar soils: 25 percent

Rock outcrop: 20 percent

Minor components: Soils that have greater than 35 percent clay content or less than 35 percent rock fragments in the particle-size control section and soils that do not meet the requirements for a mollic epipedon occur throughout the unit. Soils that are deeper than 20 inches to bedrock occur on foot slopes and small fan terraces.

Soil Properties and Qualities

Woodcutter soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Aridic Lithic Argiustolls

Geomorphic position: generally occurs on summits and back slopes

Parent material: Loamy-skeletal slope alluvium and/or residuum weathered from granite

Slope: 15 to 60 percent

Surface cover:

Biological crust

cyanobacteria: 0 percent

lichen: 0 percent

moss: 0 percent

Chemical crust

salt: 0 percent

gypsum: 0 percent

Physical cover

canopy plant cover: 55 percent

woody debris: 5 percent

bare soil: 0 percent

rock fragments

gravel: 65 percent

cobble: 5 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 0.20 to 5.95 inches per hour (1.40 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 1.0 (very low)

Shrink-swell potential: about 4.0 LEP (moderate)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Granitic Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB204AZ

Present vegetation: turbinella oak, black grama, manzanita, perennial grasses,

Soil Survey of San Carlos Indian Reservation, Arizona

sacahuista, sideoats grama, false mesquite, hairy grama, oneseed juniper, perennial forbs, shrubby buckwheat, singleleaf pinyon

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 650 feet south and 300 feet west of northeast corner of Section 18, Township 4 S, Range 20 E

Geographic Coordinate System:

33° 5' 26.63" north, 110° 19' 43.25" west

A—0 to 4 inches (0 to 10 cm); brown (7.5YR 4/3) gravelly sandy loam, very dark brown (7.5YR 2.5/2), moist; 13 percent clay; moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 20 percent gravel; noneffervescent; neutral, pH 6.6; clear wavy boundary.

Bt—4 to 12 inches (10 to 30 cm); brown (7.5YR 4/3) very gravelly sandy clay loam, dark brown (7.5YR 3/2), moist; 25 percent clay; moderate very fine and fine subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine and fine and few medium roots; many very fine and fine pores; many distinct clay films on faces of peds and rock fragments; 50 percent gravel; noneffervescent; slightly acid, pH 6.2; abrupt wavy boundary.

R—12 to 60 inches (30 to 152 cm); granitic bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 20 to 35 percent

Rock fragments: 35 to 60 percent

Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

A horizon

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 1 to 3, dry or moist

Texture: sandy loam, loam

Rock fragments: 15 to 45 percent

Bt horizons

Hue: 5YR, 7.5YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 4, dry or moist

Texture: clay loam, sandy clay loam, loam

Rock fragments: 35 to 60 percent

R horizon

Bedrock is granite

Budlamp soils

Taxonomic classification: Loamy-skeletal, mixed, superactive, thermic Aridic Lithic

Haplustolls

Geomorphic position: generally occurs on summits and back slopes

Parent material: Loamy-skeletal slope alluvium and/or residuum weathered from granite

Soil Survey of San Carlos Indian Reservation, Arizona

Slope: 15 to 60 percent

Surface cover:

Biological crust

 cyanobacteria: 0 percent

 lichen: 0 percent

 moss: 0 percent

Chemical crust

 salt: 0 percent

 gypsum: 0 percent

Physical cover

 canopy plant cover: 50 percent

 woody debris: 5 percent

 bare soil: 5 percent

 rock fragments

 gravel: 80 percent

Depth to restrictive feature(s): 5 to 20 inches to bedrock, lithic

Drainage class: well drained

Ksat solum: 1.98 to 5.95 inches per hour (14.00 to 42.00 micrometers per second)

Ksat restrictive layer: 0.00 to 0.01 inches per hour (0.00 to 0.07 micrometers per second)

Available water capacity total inches: 0.8 (very low)

Shrink-swell potential: about 1.5 LEP (low)

Flooding hazard: none

Runoff class: very high

Hydrologic group: D

Ecological site name: Granitic Hills 16-20" p.z.

Other ecological sites may occur in this map unit and vary in extent between delineations. Additional detailed site inventory is required for effective range and forest management.

Ecological site number: R038XB204AZ

Present vegetation: turbinella oak, black grama, manzanita, perennial grasses, sacahuista, sideoats grama, false mesquite, hairy grama, oneseed juniper, perennial forbs, shrubby buckwheat, singleleaf pinyon

Land capability (non irrigated): 6c

Typical Profile

Location

Public Land Survey: 400 feet north and 950 feet west of southeast corner of Section 7, Township 4 S, Range 20 E

Geographic Coordinate System:

33° 5' 36.82" north, 110° 19' 50.07" west

A1—0 to 2 inches (0 to 5 cm); brown (10YR 4/3) very gravelly sandy loam, very dark grayish brown (10YR 3/2), moist; 12 percent clay; moderate very fine and fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 35 percent gravel; noneffervescent; neutral, pH 6.8; clear wavy boundary.

A2—2 to 12 inches (5 to 30 cm); brown (10YR 5/3) very gravelly sandy loam, dark brown (10YR 3/3), moist; 15 percent clay; moderate fine and medium granular structure; soft, very friable, nonsticky and nonplastic; many very fine and fine roots; many very fine and fine pores; 45 percent gravel; noneffervescent; neutral, pH 7.0; clear wavy boundary.

Soil Survey of San Carlos Indian Reservation, Arizona

R—12 to 60 inches (30 to 152 cm); granitic bedrock.

Range in Characteristics

Particle-size control section (weighted average)

Clay content: 8 to 18 percent

Rock fragments: 35 to 60 percent

Effervescence: none

Reaction (pH): slightly acid to neutral (6.1 to 7.3)

A horizons

Hue: 7.5YR, 10YR

Value: 3 to 5 dry, 2 to 3 moist

Chroma: 2 to 3, dry or moist

Texture: sandy loam, loam

Rock fragments: 30 to 60 percent

R horizon

Bedrock is granite

Rock outcrop

Slope: 15 to 75 percent

Range in Characteristics

Rock outcrop consist of barren rock that occurs as ledges, massive boulder piles, and nearly vertical cliffs of granite. Rock outcrop also includes areas where the depth to bedrock is less than four inches. The higher percentage of rock outcrop is in areas near the summit of mountains.

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for rangeland.

Rangeland

This section prepared by J. Dave Womack, Rangeland Management Specialist, Natural Resources Conservation Service

Rangelands on the San Carlos Apache Reservation are highly diverse and range from deserts that have vegetation characteristic of both Sonoran and Chihuahuan deserts at the lower elevations to understory plant communities of ponderosa pine and mixed conifer forests at the upper elevations.

The San Carlos Apache people have adopted the cultural practice of livestock production, and this remains a source of financial income to the tribe and tribal members. In addition, the rangelands are very important in the production of resources and water for wildlife. Rangelands below about 3,200 feet are most productive in years of normal to above average rainfall when annual grasses and forbs become abundant. Perennial grass and forb plants become significant as a year-round source of forage for livestock and wildlife in the elevation range of about 3,200 to 4,400 feet. Cool-season grasses become a part of plant communities above approximately 4,400 feet, and managing for them is important as a way to provide cool-season nutrition. Warm-season grasses are very important and dominant components of the plant communities above 3,200 feet elevation, with the exception of the cooler forest environments and the dense chaparral communities where shrubs become prevalent in the 4,400 to 6,000-foot elevation range. Mixed grass and shrub communities are common in the 3,200-4,400-foot elevation range, with the exception of very clayey soils in areas where grasslands are dominant. The shrubs in these communities are important sources of nutrition when grass plant nutrition decreases.

Despite the great complexity of vegetation resources, managing them can be relatively simple.

One of the easiest and most effective management practices is prescribed grazing, or controlling livestock access to waters, which allows plants to recover from grazing. Large areas of land on the reservation remain unfenced with barbed wire fencing. These areas can be cross fenced to create smaller pastures, or fencing can be placed around waters to control livestock access to waters. Either method would achieve prescribed grazing while allowing large tracts of land to remain open to

grazing. The tribe and Bureau of Indian Affairs have made great strides in developing their surface water resources.

When access to existing waters is controlled, developing additional watering locations may also be needed. Where practical, digging water wells, developing sources of spring water, and installing windmills, pumps, or pipelines to convey water can be important for both livestock and wildlife in drought years when surface waters dry up. Developing these water resources is essential to enhance management of the plants on which livestock and wildlife depend. As water quality has become more important, tribal agencies have begun to consider fencing perennial waters and developing alternative water sources.

Landforms of the Survey Area

The survey area is in the Mexican Highland Section of the Basin and Range Physiographic Province (Fenneman, 1931) and is characterized by mountains, canyons, and structural troughs or valleys. Igneous, metamorphic, and sedimentary rock classes occur on rough mountainous terrain in association with less extensive sediment-filled valleys. Landforms are not static; they are continually being created and eroded. Some landforms are hard to distinguish; their boundaries are not always sharp but fold and blend into each other naturally. The following paragraphs describe the major landforms recognized in the survey area and some of the soils associated with these landforms.

Alluvial Fans

Alluvial fans are formed from recent alluvial material originating from mountains and hills or other upslope areas. Sediment loads are deposited when slope gradients change from upland positions to lower segments on the landscape. An inherent feature of fan development is the continuously changing pattern of channels and loci of deposition (Cooke and Warren, 1973). The alluvial areas in this survey area generally have two forms: (1) triangular alluvial fans, which formed from the high hills or the high fronts, and (2) long and narrow or elongated fans inset between fan terraces. Soil parent material is alluvium. Typical soils that occur on alluvial fans in this survey area are the Agustin, Combate, and Lanque series.

Canyons

Canyons are long, deep, narrow, very steep-sided valleys cut primarily into bedrock with high and precipitous walls, and often with a stream at the bottom. A canyon is similar to but larger than a gorge. Because of the steepness of the slopes, the soils formed on this landform are generally shallow but may be very deep. Soil parent material is typically colluvium, residuum, or slope alluvium.

Escarpmnts

Escarpmnts are a familiar feature in the survey area. They are relatively steep slopes or cliffs produced by erosion and faulting. Because of the steepness of the slopes, the soils formed on this landform are generally shallow but may be very deep. Escarpmnts can be a landform component associated with buttes, canyons, cuestras, or plateaus. Soil parent material is typically colluvium, residuum, or slope alluvium.

Fan Terraces

Fan terraces are relict alluvial fans that have been dissected, or downcut, to the point that flooding no longer occurs and active deposition has ceased. They vary greatly in their makeup. These landforms commonly have two important components,

depending on the amount of dissection: the summit or tread, where erosional activity is relatively low; and the back slope or riser, where erosion is cutting into the more stable summit. The soils on fan terraces exhibit different stages of soil development, which is characterized by well developed argillic, calcic, and cemented horizons. They range from nearly level to steep. Commonly, the soils on the higher, steeper areas closest to the mountain fronts have more rock fragments than the soils on the lower, less sloping areas. Soil parent material is alluvium. Typical soils that occur on fan terraces in this survey area are the Eloma, Terrarossa, Tombstone, and Topawa series.

Flood Plains

Flood plains are areas that border streams or drains that are subject to periodic flooding and are continually being formed from Holocene and present-day stream alluvium. Floodwaters in the survey area flow at low to very low slope gradients adjacent to basin floor and fan terraces. The soils on the flood plains receive periodic depositions of fresh alluvium, resulting in an irregular decrease in organic matter and weak or no soil profile development. Soil parent material is alluvium. Typical soils that occur on the flood plains in this survey area are the Cascabel, Gila, Glendale, and Queenecreek series.

Hills and Mountains

Hills and mountains are elevated areas of the land surface with a nominal summit area relative to side slopes and percent slope ranging from moderate to very steep. They are characterized by soil development that is highly dependent on the nature of the bedrock, such as its chemical composition, grain size, and hardness. The most influential soil-forming factors on the hills and mountains are time and the slope gradient of the bedrock. The soils on these landforms vary greatly in soil development. Some show no evidence of development, and others have well developed argillic, calcic, and/or petrocalcic horizons. Soil parent material is generally residuum on the summit position and colluvium or slope alluvium on the side slopes. Typical soils that occur on the hills and mountains in this survey area are Beaumain, Cammerman, Lampshire, Kuykendall, and Romero series.

Mesas

Mesas are broad, nearly flat-topped, and usually isolated landmasses bounded by steep slopes or precipitous cliffs. They are capped by a resistant, nearly horizontal, rocky summit with width greater than the height of bounding escarpments. The summit is a nearly level to gently sloping, bedrock-controlled surface that is generally stable. The soils are typically well developed and characterized by well expressed argillic horizons. The escarpment, where erosional activity is cutting back into the more stable summit, has little or no horizon development.

Pediments

Pediments are gently sloping erosional surfaces developed at the foot of a receding hill or mountain slope, commonly with a slightly concave-upward profile, that cross-cuts rock or sediment strata that extend beneath adjacent uplands. The erosion surface may be essentially bare bedrock, or it may be thinly mantled (e.g., 1 to 3 meters) with debris such as colluvium, pedisediment, or alluvium that is in transit from an upland front to basin or valley lowland. The depth to bedrock ranges from less than 20 inches to more than 60 inches. Soil parent material is generally residuum or

alluvium but may be colluvium. Typical soils that occur on the pediments in the survey area are the Cherrycow and Oracle series.

Plateaus

Plateaus are large, comparatively flat areas. Specifically, a plateau is an extensive land region that is considerably elevated above adjacent lower-lying terrain, is commonly limited on at least one side by an abrupt descent, and has a flat or nearly level surface. A comparatively large part of a plateau surface is near summit level. Many other landforms can exist on plateaus. Soil parent material is generally residuum or local alluvium. Typical soils that occur on the plateaus in the survey area are the Anezul, Brolliar, Dedal, and Showlow series.

References

Cooke, Ronald U. and Andrew Warren. 1973. *Geomorphology in deserts. Part 1—The desert context*. University of California Press, Berkeley, California.

Fenneman, N.M. 1931. *Physiography of the western United States*. Magraw-Hill Co., New York, NY; 534p.

Fenneman, N.M. 1946. (Reprinted 1957). *Physical divisions of the United States*. US Geological Survey, US Government Printing Office, Washington, DC; 1 sheet; 1: 7,000,000.

Schoeneberger, P.J., D.A. Wysocki, E.C. Benham, and W.D. Broderson, eds. 2002. *Field book for describing and sampling soils. Version 2.0*. U.S. Department of Agriculture, Natural Resources Conservation Service.

Soil Survey Division Staff. 1993. *Soil survey manual*. Soil Conservation Service. U.S. Department of Agriculture Handbook 18. Available online at <http://soils.usda.gov/technical/>.

Soil Survey Staff. 1999. *Soil taxonomy: A basic system of soil classification for making and interpreting soil surveys*. 2nd ed. Natural Resources Conservation Service. U.S. Department of Agriculture Handbook 436.

Soil Survey Staff. 2006. *Keys to soil taxonomy*. 10th ed. U.S. Department of Agriculture, Natural Resources Conservation Service.

U.S. Department of Agriculture, Natural Resources Conservation Service, 2007. *National Soil Survey Handbook, title 430-VI*. [Online] Available: <http://soils.usda.gov/technical/handbook/> .

Glossary

Many of the terms relating to landforms, geology, and geomorphology are defined in more detail in the "National Soil Survey Handbook" (available in local offices of the Natural Resources Conservation Service or on the Internet).

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Alluvial fan. A low, outspread mass of loose materials and/or rock material, commonly with gentle slopes. It is shaped like an open fan or a segment of a cone. The material was deposited by a stream at the place where it issues from a narrow mountain valley or upland valley or where a tributary stream is near or at its junction with the main stream. The fan is steepest near its apex, which points upstream, and slopes gently and convexly outward (downstream) with a gradual decrease in gradient.

Alluvium. Unconsolidated material, such as gravel, sand, silt, clay, and various mixtures of these, deposited on land by running water.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.

Aspect. The direction toward which a slope faces. Also called slope aspect.

Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

- Backslope.** The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.
- Badland.** A landscape that is intricately dissected and characterized by a very fine drainage network with high drainage densities and short, steep slopes and narrow interfluves. Badlands develop on surfaces that have little or no vegetative cover overlying unconsolidated or poorly cemented materials (clays, silts, or sandstones) with, in some cases, soluble minerals, such as gypsum or halite.
- Base saturation.** The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.
- Bedrock.** The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.
- Boulders.** Rock fragments larger than 2 feet (60 centimeters) in diameter.
- Breaks.** A landscape or tract of steep, rough or broken land dissected by ravines and gullies and marking a sudden change in topography.
- Calcareous soil.** A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.
- Canopy.** The upper part of a tree or shrub, including the living branches and their foliage.
- Canyon.** A long, deep, narrow valley with high, precipitous walls in an area of high local relief.
- Capillary water.** Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.
- Cation.** An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.
- Cation-exchange capacity.** The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.
- Channery soil material.** Soil material that has, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a chanter.
- Clay.** As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.
- Clay film.** A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.
- Coarse textured soil.** Sand or loamy sand.
- Cobble (or cobblestone).** A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.
- Cobbly soil material.** Material that has 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.
- COLE (coefficient of linear extensibility).** See Linear extensibility.
- Colluvium.** Unconsolidated, unsorted earth material being transported or deposited on side slopes and/or at the base of slopes by mass movement (e.g., direct gravitational action) and by local, unconcentrated runoff.
- Complex slope.** Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.
- Complex, soil.** A map unit of two or more kinds of soil or miscellaneous areas in

such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conglomerate. A coarse grained, clastic sedimentary rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Consistence, soil. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion (soil survey interpretations). Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Dense layer. A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Desert pavement. A natural, residual concentration or layer of wind-polished, closely packed gravel, boulders, and other rock fragments mantling a desert surface. It forms where wind action and sheetwash have removed all smaller particles or where rock fragments have migrated upward through sediments to the surface. It typically protects the finer grained underlying material from further erosion.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized—*excessively drained*, *somewhat excessively drained*, *well drained*, *moderately well drained*, *somewhat poorly drained*, *poorly drained*, and *very poorly drained*. These classes are defined in the "Soil Survey Manual."

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. A general term for a course or channel along which water moves in draining an area. A term restricted to relatively small, linear depressions that at some time move concentrated water and either do not have a defined channel or have only a small defined channel.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other ecological sites in kind and/or proportion of species or in total production.

- Eluviation.** The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.
- Endosaturation.** A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.
- Eolian deposit.** Sand-, silt-, or clay-sized clastic material transported and deposited primarily by wind, commonly in the form of a dune or a sheet of sand or loess.
- Ephemeral stream.** A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.
- Erosion.** The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.
Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.
Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.
- Escarpment.** A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Most commonly applied to cliffs produced by differential erosion. Synonym: scarp.
- Extrusive rock.** Igneous rock derived from deep-seated molten matter (magma) deposited and cooled on the earth's surface.
- Fan terrace.** A general term for landforms that are the remaining parts of older fan landforms, such as alluvial fans, that have been either dissected or partially buried.
- Field moisture capacity.** The moisture content of a soil, expressed as a percentage of the oven-dry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity*, *normal moisture capacity*, or *capillary capacity*.
- Fine textured soil.** Sandy clay, silty clay, or clay.
- Flaggy soil material.** Material that has, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.
- Flagstone.** A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.
- Flood plain.** The nearly level plain that borders a stream and is subject to flooding unless protected artificially.
- Flood-plain bench.** An essentially flat, terrace-like alluvial surface within a valley that is covered by floodwater from the present stream; any approximately horizontal surface still actively modified by fluvial scour and/or deposition. May occur individually or as a series of benches.
- Flooding frequency classes.** None—No reasonable possibility of flooding (near 0 percent chance of flooding in any year). Rare—Flooding unlikely but possible under unusual weather conditions (from near 0 to 5 percent chance or near 0 to 5 times in 100 years). Occasional—Flooding is expected infrequently under usual weather conditions (5 to 50 percent chance of flooding or 5 to 50 times in 100 years). Frequent—Flooding is likely to occur often under usual weather conditions (more than a 50 percent chance of flooding or more than 50 times in 100 years). Common—Occasional and frequent classes can be grouped for certain purposes and called common flooding.
- Fluvial.** Of or pertaining to rivers or streams; produced by stream or river action.

- Foothills.** A region of steeply sloping hills that fringes a mountain range or high-plateau escarpment. The hills have relief of as much as 1,000 feet (300 meters).
- Footslope.** The concave surface at the base of a hillslope. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).
- Forb.** Any herbaceous plant not a grass or a sedge.
- Genesis, soil.** The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.
- Gilgai.** Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.
- Gleyed soil.** Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.
- Gravel.** Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.
- Gravelly soil material.** Material that has 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.
- Ground water.** Water filling all the unblocked pores of the material below the water table.
- Gully.** A small channel with steep sides caused by erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.
- Hard bedrock.** Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.
- Hardpan.** A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.
- Hill.** A generic term for an elevated area of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline. Slopes are generally more than 15 percent. The distinction between a hill and a mountain is arbitrary and may depend on local usage.
- Horizon, soil.** A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:
- O horizon.*—An organic layer of fresh and decaying plant residue.
- A horizon.*—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.
- E horizon.*—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.
- B horizon.*—The mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon.—Soft, consolidated bedrock beneath the soil.

R layer.—Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential.

The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock that was formed by cooling and solidification of magma and that has not been changed appreciably by weathering since its formation. Major varieties include plutonic and volcanic rock (e.g., andesite, basalt, and granite).

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Intermittent stream. A stream, or reach of a stream, that does not flow year-round but that is commonly dry for 3 or more months out of 12 and whose channel is generally below the local water table. It flows only during wet periods or when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

K_{sat}. Saturated hydraulic conductivity. (See Permeability.)

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

- Leaching.** The removal of soluble material from soil or other material by percolating water.
- Linear extensibility.** Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at $\frac{1}{3}$ - or $\frac{1}{10}$ -bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.
- Liquid limit.** The moisture content at which the soil passes from a plastic to a liquid state.
- Loam.** Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.
- Low strength.** The soil is not strong enough to support loads.
- Masses.** Soft concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration. See Redoximorphic features.
- Medium textured soil.** Very fine sandy loam, loam, silt loam, or silt.
- Mesa.** A broad, nearly flat topped and commonly isolated landmass bounded by steep slopes or precipitous cliffs and capped by layers of resistant, nearly horizontal rocky material. The summit width is characteristically greater than the height of the bounding escarpments.
- Metamorphic rock.** Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement at depth in the earth's crust. Nearly all such rocks are crystalline.
- Mineral soil.** Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.
- Miscellaneous area.** A kind of map unit that has little or no natural soil and supports little or no vegetation.
- Moderately coarse textured soil.** Coarse sandy loam, sandy loam, or fine sandy loam.
- Moderately fine textured soil.** Clay loam, sandy clay loam, or silty clay loam.
- Mollic epipedon.** A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.
- Morphology, soil.** The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.
- Mottling, soil.** Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance—*few*, *common*, and *many*; size—*fine*, *medium*, and *coarse*; and contrast—*faint*, *distinct*, and *prominent*. The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).
- Mountain.** A generic term for an elevated area of the land surface, rising more than 1,000 feet (300 meters) above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Mountains are formed primarily by tectonic activity and/or volcanic action but can also be formed by differential erosion.

Mudstone. A blocky or massive, fine grained sedimentary rock in which the proportions of clay and silt are approximately equal. Also, a general term for such material as clay, silt, claystone, siltstone, shale, and argillite and that should be used only when the amounts of clay and silt are not known or cannot be precisely identified.

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Nodules. Hard cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations. See Redoximorphic features.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Paleosol. A soil that formed on a landscape in the past and that has distinctive morphological features resulting from a soil-forming environment that no longer exists at the site. The former pedogenic process was either altered because of external environmental change or interrupted by burial.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan*, *fragipan*, *claypan*, *plowpan*, and *traffic pan*.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter. The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pediment. A gently sloping erosional surface developed at the foot of a receding hill or mountain slope, commonly with a slightly concave-upward profile, that cross-cuts rock or sediment strata that extend beneath adjacent uplands. The erosion surface may be essentially bare bedrock (i.e. *rock pediment*), or it may be thinly mantled (e.g. 1 to 3 m) with debris (i.e. *pediment*) such as colluvium, pedisediment, or alluvium that is ultimately in transit from an upland front to basin or valley lowland.

Pedisediment. A layer of sediment, eroded from the shoulder and backslope of an erosional slope, that lies on and is being (or was) transported across a gently sloping erosional surface at the foot of a receding hill or mountain slope.

Pedon. The smallest volume that can be called “a soil.” A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The movement of water through the soil.

Permeability. The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. In soil physics, the rate is referred to as “saturated hydraulic conductivity,” which is defined in the “Soil Survey Manual.” In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as “permeability.” Terms describing permeability, measured in inches per hour, are as follows:

Impermeable	less than 0.0015 inch
Very slow	0.0015 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Petrocalcic horizon. A continuous or fractured, cemented or indurated calcic horizon cemented by carbonates and some silica. This is the same as a lime cemented hardpan or a cemented calcium carbonate hardpan.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

Piping. Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plateau (geomorphology). A comparatively flat area of great extent and elevation; specifically, an extensive land region that is considerably elevated (more than 100 meters) above the adjacent lower lying terrain, is commonly limited on at least one side by an abrupt descent, and has a flat or nearly level surface. A comparatively large part of a plateau surface is near summit level.

Playa. The generally dry and nearly level lake plain that occupies the lowest parts of closed depressions, such as those on intermontane basin floors. Temporary flooding occurs primarily in response to precipitation and runoff. Playa deposits are fine grained and may or may not have a high water table and saline conditions.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Potential rooting depth (effective rooting depth). Depth to which roots could

penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed as pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Redoximorphic features. Redoximorphic features are associated with wetness and result from alternating periods of reduction and oxidation of iron and manganese compounds in the soil. Reduction occurs during saturation with water, and oxidation occurs when the soil is not saturated. Characteristic color patterns are created by these processes. The reduced iron and manganese ions may be removed from a soil if vertical or lateral fluxes of water occur, in which case there is no iron or manganese precipitation in that soil. Wherever the iron and manganese are oxidized and precipitated, they form either soft masses or hard concretions or nodules. Movement of iron and manganese as a result of redoximorphic processes in a soil may result in redoximorphic features that are defined as follows:

1. Redoximorphic concentrations.—These are zones of apparent accumulation of iron-manganese oxides, including:
 - A. Nodules and concretions, which are cemented bodies that can be removed from the soil intact. Concretions are distinguished from nodules on the basis of internal organization. A concretion typically has concentric layers that are visible to the naked eye. Nodules do not have visible organized internal structure; *and*
 - B. Masses, which are noncemented concentrations of substances within the soil matrix; *and*
 - C. Pore linings, i.e., zones of accumulation along pores that may be either coatings on pore surfaces or impregnations from the matrix adjacent to the pores.
2. Redoximorphic depletions.—These are zones of low chroma (chromas less than those in the matrix) where either iron-manganese oxides alone or both iron-manganese oxides and clay have been stripped out, including:
 - A. Iron depletions, i.e., zones that contain low amounts of iron and

manganese oxides but have a clay content similar to that of the adjacent matrix; *and*

B. Clay depletions, i.e., zones that contain low amounts of iron, manganese, and clay (often referred to as silt coatings or skeletons).

3. Reduced matrix.—This is a soil matrix that has low chroma *in situ* but undergoes a change in hue or chroma within 30 minutes after the soil material has been exposed to air.

Regolith. All unconsolidated earth materials above the solid bedrock. It includes material weathered in place from all kinds of bedrock and alluvial, glacial, eolian, lacustrine, and pyroclastic deposits.

Relief. The relative difference in elevation between the upland summits and the lowlands or valleys of a given region.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as bedrock disintegrated in place.

Rill. A very small, steep-sided channel resulting from erosion and cut in unconsolidated materials by concentrated but intermittent flow of water. A rill generally is not an obstacle to wheeled vehicles and is shallow enough to be smoothed over by ordinary tillage.

Road cut. A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Salinity. The degree to which a soil is affected by soluble salts. The amount of total salts in the soil is ascertained by measuring the conductivity of a saturated soil extract. The conductivity is measured in decisiemens per meter (dS/m), which are the same as millimhos per centimeter (mmhos/cm). Classes of salinity are:

Nonsaline	0 to 2 dS/m
Very slightly saline	2 to 4 dS/m
Slightly saline	4 to 8 dS/m
Moderately saline	8 to 16 dS/m
Strongly saline	16 to 32 dS/m

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Saturated hydraulic conductivity (K_{sat}). See Permeability.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Sedimentary rock. A consolidated deposit of clastic particles, chemical precipitates, or organic remains accumulated at or near the surface of the earth under normal low temperature and pressure conditions. Sedimentary rocks include consolidated equivalents of alluvium, colluvium, drift, and eolian, lacustrine, and marine deposits. Examples are sandstone, siltstone, mudstone, claystone, shale, conglomerate, limestone, dolomite, and coal.

- Series, soil.** A group of soils that have profiles that are almost alike. All the soils of a given series have horizons that are similar in composition, thickness, and arrangement.
- Shale.** Sedimentary rock that formed by the hardening of a deposit of clay, silty clay, or silty clay loam and that has a tendency to split into thin layers.
- Sheet erosion.** The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.
- Shoulder.** The convex, erosional surface near the top of a hillslope. A shoulder is a transition from summit to backslope.
- Shrink-swell** The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.
- Silica.** A combination of silicon and oxygen. The mineral form is called quartz.
- Silt.** As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.
- Siltstone.** An indurated silt having the texture and composition of shale but lacking its fine lamination or fissility; a massive mudstone in which silt predominates over clay.
- Similar soils.** Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.
- Slickensides.** Grooved, striated, and/or glossy (shiny) slip faces on structural pedes, such as wedges; produced by shrink-swell processes, most commonly in soils that have a high content of expansive clays.
- Slope.** The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.
- Slope alluvium.** Sediment gradually transported down the slopes of mountains or hills primarily by nonchannel alluvial processes (i.e., slope-wash processes) and characterized by particle sorting. Lateral particle sorting is evident on long slopes. In a profile sequence, sediments may be distinguished by differences in size and/or specific gravity of rock fragments and may be separated by stone lines. Burnished pedes and sorting of rounded or subrounded pebbles or cobbles distinguish these materials from unsorted colluvial deposits.
- Sodic (alkali) soil.** A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.
- Sodicity.** The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of Na^+ to $\text{Ca}^{++} + \text{Mg}^{++}$. The degrees of sodicity and their respective ratios are:
- | | |
|----------------|----------------|
| Slight | less than 13:1 |
| Moderate | 13-30:1 |
| Strong | more than 30:1 |
- Sodium adsorption ratio (SAR).** A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.
- Soft bedrock.** Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.
- Soil.** A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of

climate and living matter acting on earthy parent material, as conditioned by relief and by the passage of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. In a vertical cross section, a line formed by scattered fragments or a discrete layer of angular and subangular rock fragments (commonly a gravel- or cobble-sized lag concentration) that formerly was draped across a topographic surface and was later buried by additional sediments. A stone line generally caps material that was subject to weathering, soil formation, and erosion before burial. Many stone lines seem to be buried erosion pavements, originally formed by sheet and rill erosion across the land surface.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel, originally formed near the level of the stream; represents the remnants of an abandoned flood plain, stream bed, or valley floor produced during a former state of fluvial erosion or deposition.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are

slightly outside the range defined for the family of the series for which the soils are named.

Terrace (conservation). An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geomorphology). A steplike surface, bordering a valley floor or shoreline, that represents the former position of a flood plain, lake, or seashore. The term is usually applied both to the relatively flat summit surface (tread) that was cut or built by stream or wave action and to the steeper descending slope (scarp or riser) that has graded to a lower base level of erosion.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay*. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Toeslope. The gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tuff. A generic term for any consolidated or cemented deposit that is 50 percent or more volcanic ash.

Upland. An informal, general term for the higher ground of a region, in contrast with a low-lying adjacent area, such as a valley or plain, or for land at a higher elevation than the flood plain or low stream terrace; land above the footslope zone of the hillslope continuum.

Urban land. Areas of soil so altered by construction or obscured by structures and pavement that identification of the soil is difficult or impossible.

Valley fill. The unconsolidated sediment deposited by any agent so as to fill or partly fill a valley.

Variation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

Weathering. All physical disintegration, chemical decomposition, and biologically induced changes in rocks or other deposits at or near the earth's surface by atmospheric or biologic agents or by circulating surface waters but involving essentially no transport of the altered material.

Wilting point (or permanent wilting point). The moisture content of soil, on an oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

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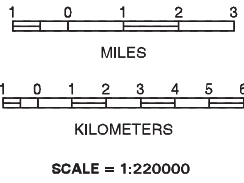
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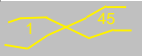
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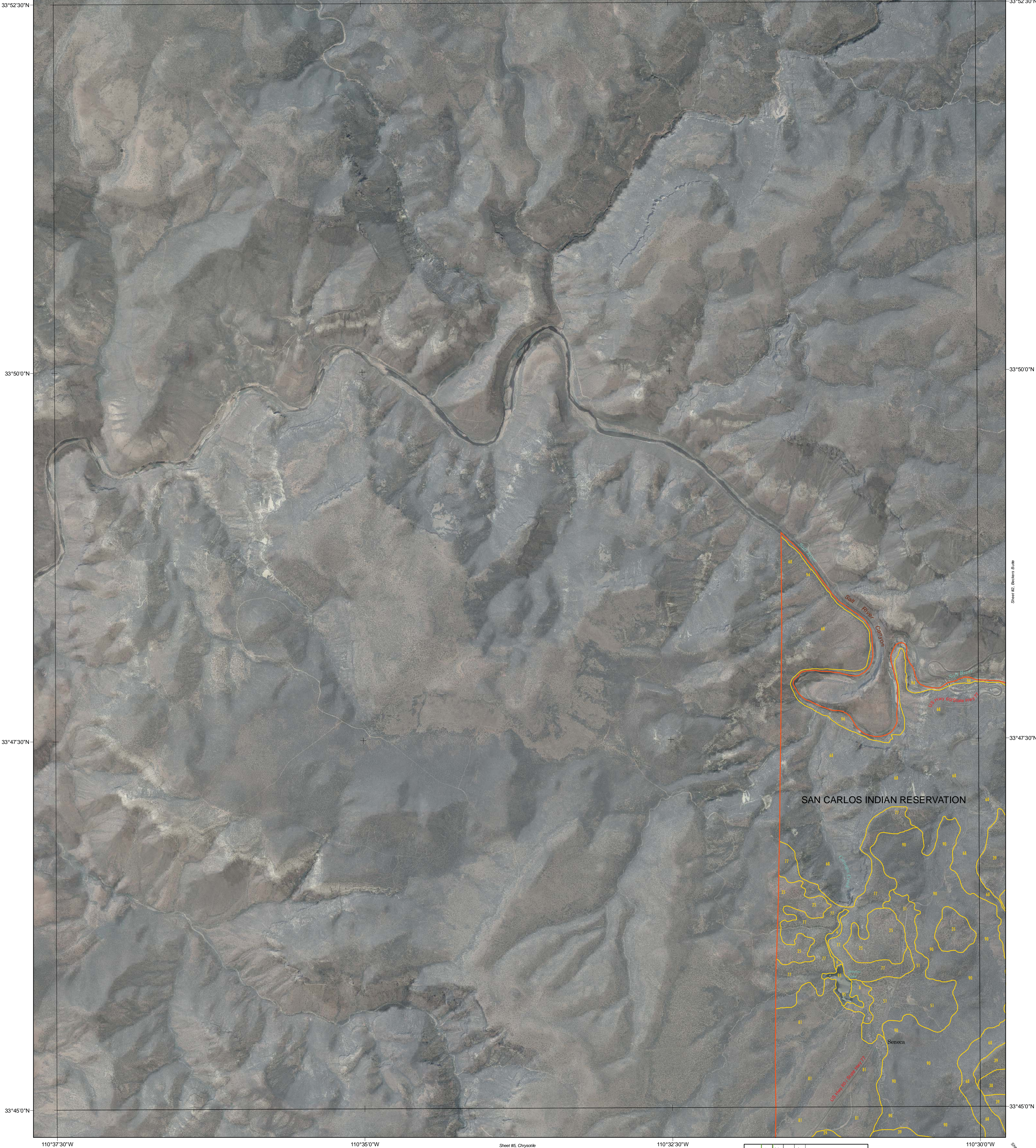


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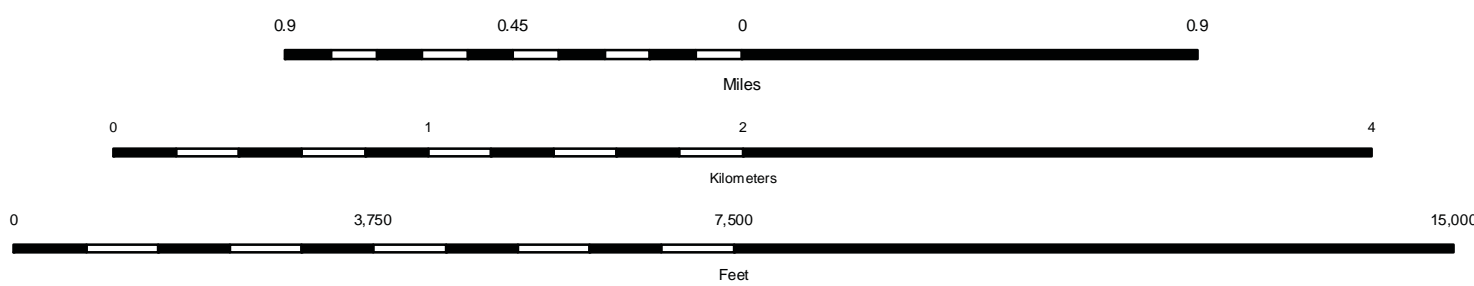


SOIL LEGEND				CONVENTIONAL AND SPECIAL SYMBOLS LEGEND	
CULTURAL FEATURES		CONVENTIONAL AND SPECIAL SYMBOLS			
SYMBOL	NAME	SYMBOL	NAME	BOUNDARIES	SOIL DELINEATIONS AND SYMBOLS
1	Augustin gravelly coarse sand, 1 to 5 percent slopes	50	Nahda-Delnorte complex, 1 to 10 percent slopes	County or parish	
2	Agustin-Urban land complex, 1 to 5 percent slopes	51	Nugget-Lanque complex, 1 to 35 percent slopes	Limit of soil survey (label) and/or denied access area	
3	Anezul-Dedal-Rock outcrop complex, 2 to 20 percent slopes	52	Oracle-Romero-Combate complex, 1 to 35 percent slopes		
4	Anthony and Glendale soils, and Riverwash, 0 to 3 percent slopes	53	Oxyaquic Ustifluvents-Rafter family-Water complex, 0 to 3 percent slopes		
5	Anthony-Gila complex, 0 to 3 percent slopes	54	Pachic Argiustolls-Dedal-Rock outcrop complex, 8 to 35 percent slopes		
6	Aquents and Ustifluvents soils and Water, 0 to 5 percent slopes	55	Pantak-Rock outcrop-Lampshire complex, 5 to 60 percent slopes		
7	Argic Petrocalcids-Rock outcrop-Torriorthents complex, 2 to 60 percent slopes	56	Paymaster family and Typic Fluvaquents soils and Riverwash, 0 to 3 percent slopes		
8	Ashcreek-Stanford-Lanque association, 0 to 3 percent slopes	57	Paymaster family-Water-Oxyaquic Ustifluvents complex, 0 to 3 percent slopes		
9	Beaumain-Rock outcrop-Cherrycow complex, 5 to 60 percent slopes	58	Popcorn soils-Rock outcrop complex, 10 to 50 percent slopes		
10	Bigtoe-Ryallen-Tombstone complex, 3 to 30 percent slopes	59	Queencreek soils and Riverwash, 0 to 5 percent slopes		
11	Biplane family-Rock outcrop complex, 15 to 50 percent slopes	60	Queencreek-Brazito-Riverwash complex, 0 to 8 percent slopes		
12	Bodecker soils and Riverwash, 0 to 5 percent slopes	61	Rafter-Riverwash complex, 1 to 5 percent slopes		
13	Brewster-Rock outcrop-Woodcutter complex, 10 to 60 percent slopes	62	Ripsey-Rock outcrop complex, 15 to 70 percent slopes		
14	Brolliar-Dedal complex, 0 to 8 percent slopes	63	Riverwash-Amuzet complex, 0 to 3 percent slopes		
15	Bucklebar-Hayhook complex, 1 to 15 percent slopes	64	Riverwash-Brazito-Oxyaquic Torrifluvents complex, 2 to 5 percent slopes		
16	Budlamp-Rock outcrop-Beaumain complex, sandstone, 10 to 50 percent slopes	65	Riverwash-Ubik-Oxyaquic Torrifluvents complex, 0 to 5 percent slopes		
17	Bylas-Rock outcrop-Frye complex, 0 to 20 percent slopes	66	Rock outcrop and Dedal and Docdee soils, 35 to 75 percent slopes		
18	Cambern-Bushvalley complex, 1 to 15 percent slopes	67	Rock outcrop and Ustorthents and Haplustolls soils, 40 to 80 percent slopes		
19	Cammerman-Rock outcrop complex, 15 to 55 percent slopes	68	Rock outcrop-Argiustolls-Haplustepts association, 40 to 80 percent slopes		
20	Cascabel and Wetrock soils, and Water, 0 to 3 percent slopes	69	Rock outcrop-Beaumain-Magoffin complex, 10 to 50 percent slopes		
21	Cellar-Rock outcrop complex, 20 to 70 percent slopes	70	Rock outcrop-Dozer complex, 20 to 60 percent slopes		
22	Cherrycow-Hathaway families complex, 15 to 50 percent slopes	71	Rock outcrop-Lajitas complex, 5 to 60 percent slopes		
23	Cherrycow-Kuykendall-Rock outcrop complex, 1 to 8 percent slopes	72	Rock outcrop-Lampshire complex, 15 to 50 percent slopes		
24	Cloverdale stony clay loam, 1 to 15 percent slopes	73	Rock outcrop-Thimble-Ruidoso family complex, 15 to 65 percent slopes		
25	Cloverdale-Cherrycow-Kuykendall complex, 2 to 10 percent slopes	74	Romero-Rock outcrop complex, 15 to 50 percent slopes		
26	Cloverdale-Terrarossa complex, 1 to 5 percent slopes	75	Romero-Rock outcrop-Oracle complex, 20 to 70 percent slopes		
27	Coppercan-Rock outcrop complex, 5 to 20 percent slopes	76	Showlow gravelly loam, 1 to 15 percent slopes		
28	Eloma very gravelly sandy clay loam, 3 to 65 percent slopes	77	Silverstrike family-Yarbam-Rock outcrop complex, 15 to 60 percent slopes		
29	Eskiminzin and Sontag soils, and Rock outcrop, 0 to 5 percent slopes	78	Sponiker-Bigprairie complex, 1 to 5 percent slopes		
30	Eskiminzin-Rock outcrop complex, 35 to 65 percent slopes	79	Stagecoach-Haplogypsids-Delnorte complex, 5 to 80 percent slopes		
31	Eskiminzin-Sontag-Rock outcrop complex, 2 to 45 percent slopes	80	Terrarossa-Blacktail complex, 5 to 60 percent slopes		
32	Ess-Pocomate family association, 20 to 70 percent slopes	81	Terrarossa-Cloverdale-Blacktail complex, 1 to 35 percent slopes		
33	Frazwell family-Riverwash complex, 0 to 2 percent slopes	82	Thimble-Rock outcrop complex, 10 to 50 percent slopes		
34	Frye gravelly loam, 0 to 3 percent slopes	83	Tombstone-Eloma-Pedregosa complex, 5 to 65 percent slopes		
35	Gavilan family-Sponiker complex, 1 to 25 percent slopes	84	Tombstone-Torriorthents complex, 5 to 70 percent slopes		
36	Glendale-Gila complex, 0 to 3 percent slopes	85	Topawa very gravelly sandy loam, 3 to 15 percent slopes		
37	Glendale-Gila complex, saline-sodic, 0 to 3 percent slopes	86	Topawa-Rillino-Eba complex, 3 to 50 percent slopes		
38	Goldust-Rock outcrop complex, 2 to 15 percent slopes	87	Torriorthents, 3 to 60 percent slopes		
39	Goldust-Rock outcrop complex, 15 to 50 percent slopes	88	Turist family-Rock outcrop complex, 15 to 40 percent slopes		
40	Granolite-Rock outcrop-Akela complex, 5 to 45 percent slopes	89	Turquoise-Coppercan complex, 5 to 45 percent slopes		
41	Haplogypsids-Whitecliff-Badlands complex, 1 to 80 percent slopes	90	Turquoise-Rock outcrop-Nugget complex, 20 to 70 percent slopes		
42	Haplustalfs-Rock outcrop complex, 20 to 75 percent slopes	91	Typic Fluvaquents, Wetrock soils, and Water, 0 to 3 percent slopes		
43	Hurds family-Rock outcrop-Brunopeak complex, 15 to 55 percent slopes	92	Urban land-Agustin-Glendale complex, 1 to 5 percent slopes		
44	Kuykendall-Beaumain-Rock outcrop complex, 5 to 45 percent slopes	93	Urban land-Topawa complex, 1 to 30 percent slopes		
45	Kuykendall-Rock outcrop-Cloverdale complex, 1 to 25 percent slopes	94	Ustifluvents soils, Riverwash, Rock outcrop, and Water, 0 to 2 percent slopes		
46	Kuykendall-Rock outcrop-Woodcutter complex, 3 to 50 percent slopes	95	Water		
47	Limpia family-Beaumain-Rock outcrop complex, 10 to 50 percent slopes	96	Wetrock, Vinton, and Typic Fluvaquents soils, and Water, 0 to 3 percent slopes		
48	Lithic Haplustolls-Anezul-Rock outcrop complex, 1 to 40 percent slopes	97	Woodcutter-Budlamp-Rock outcrop complex, 15 to 60 percent slopes		
49	Mabray-Rock outcrop complex, 20 to 75 percent slopes				

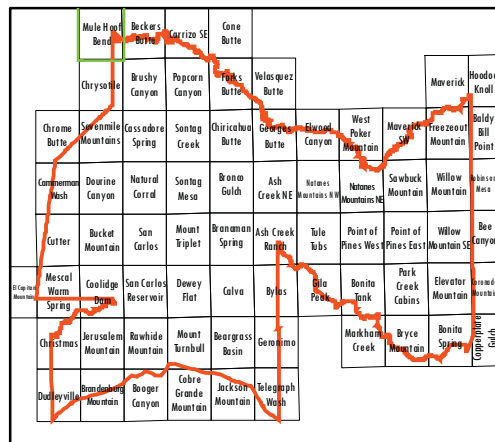


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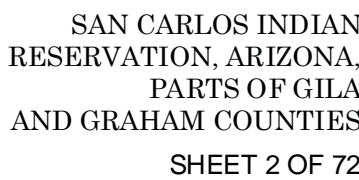
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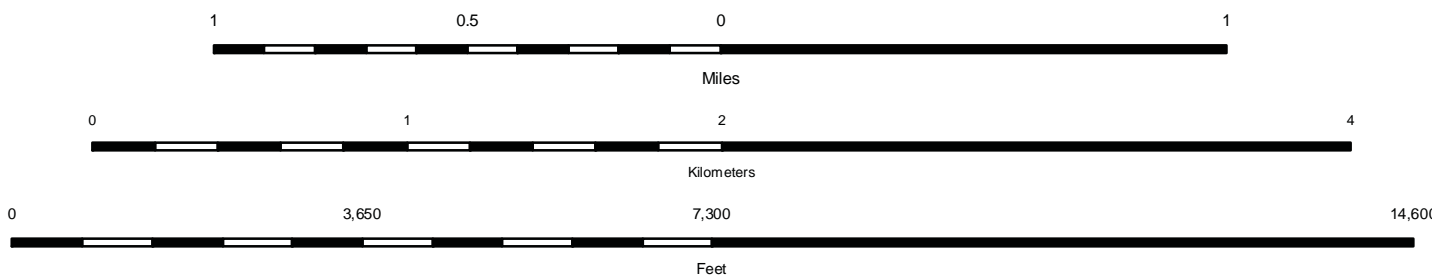
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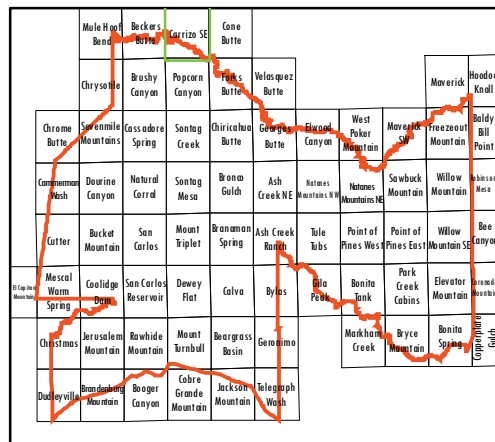


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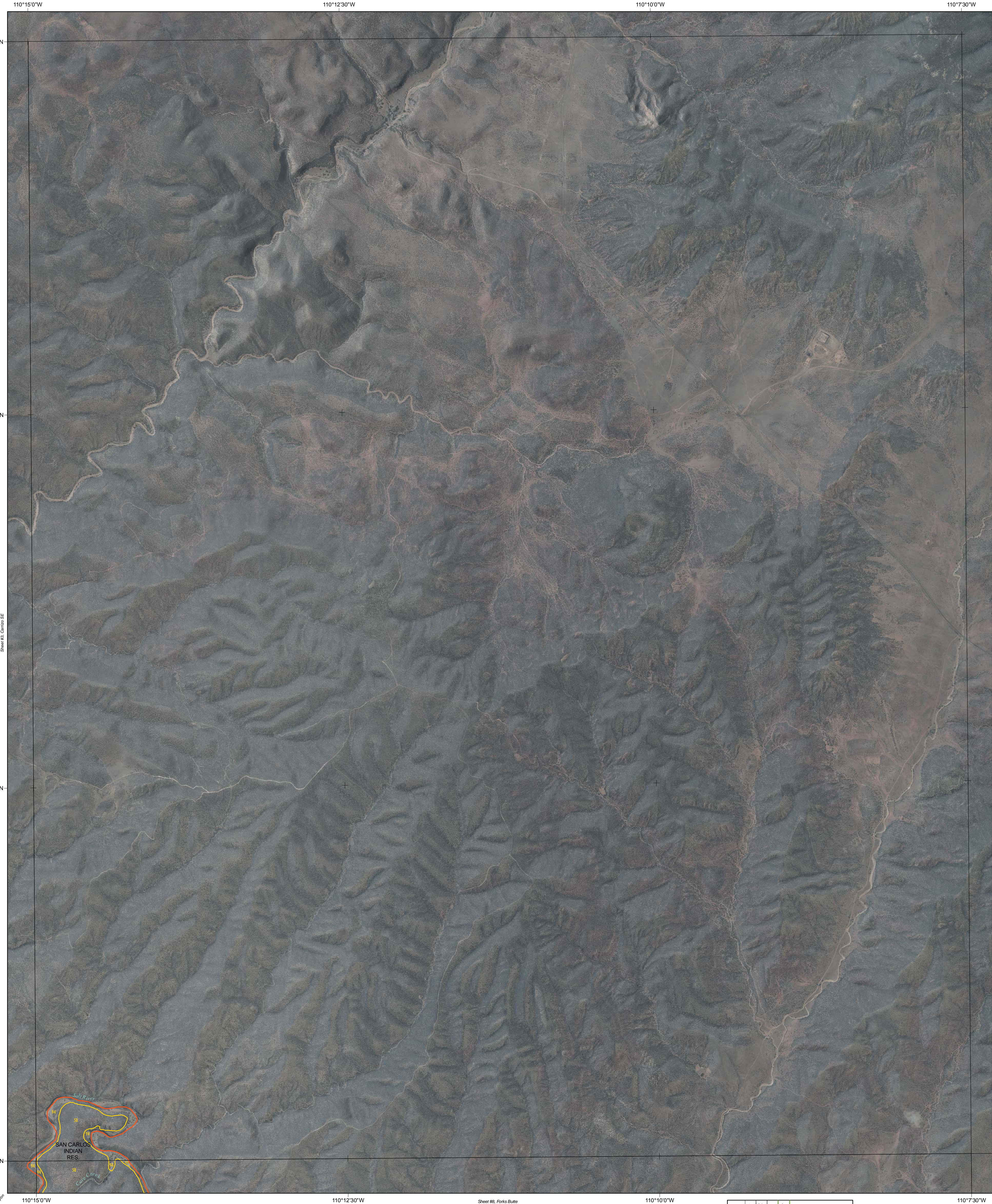


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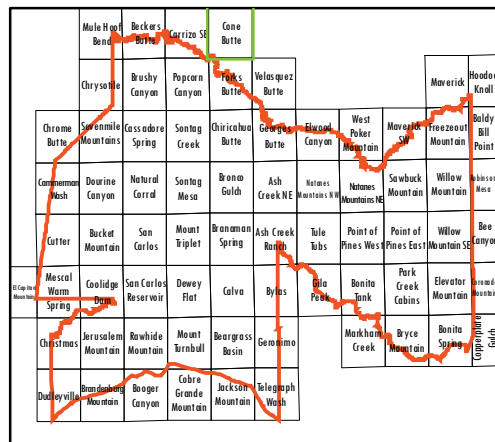
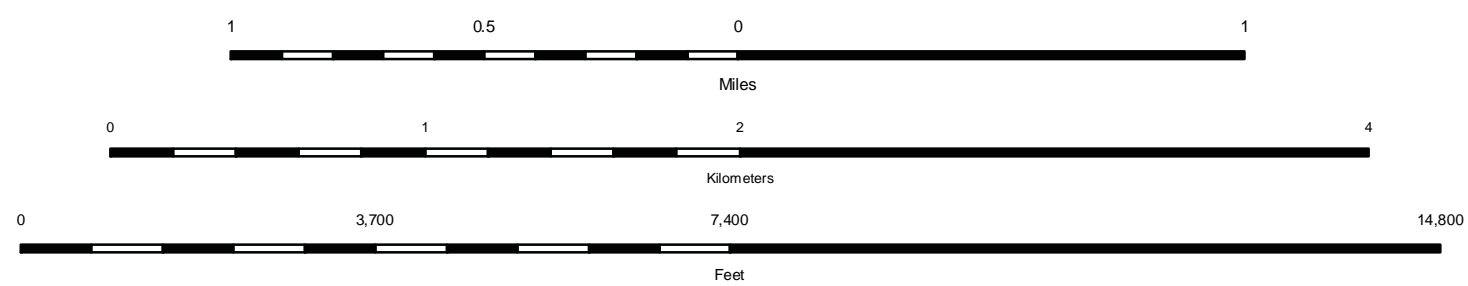
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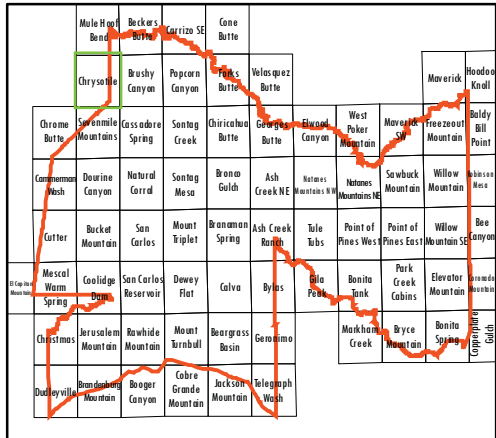
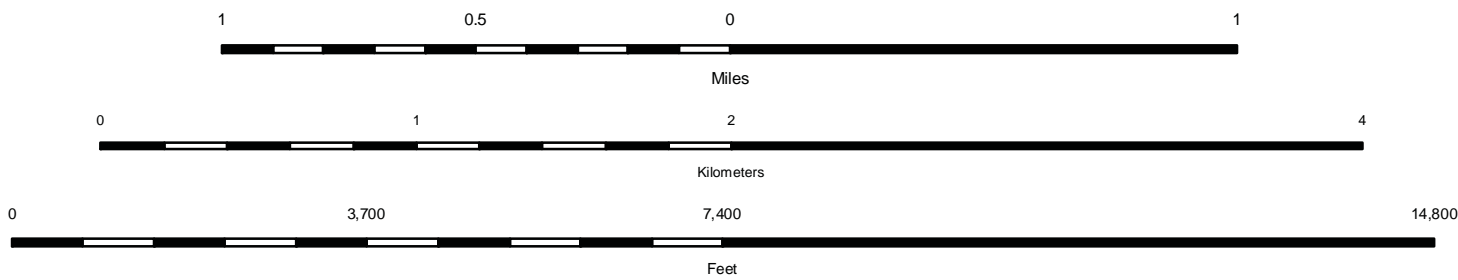
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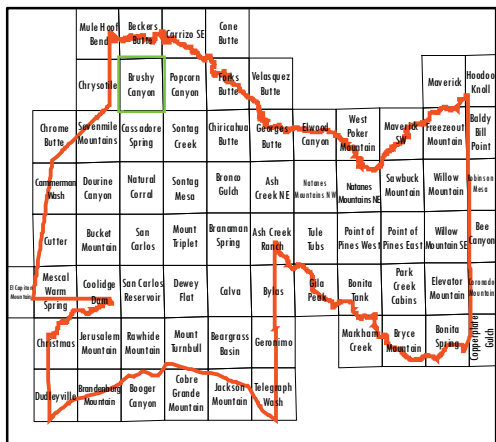
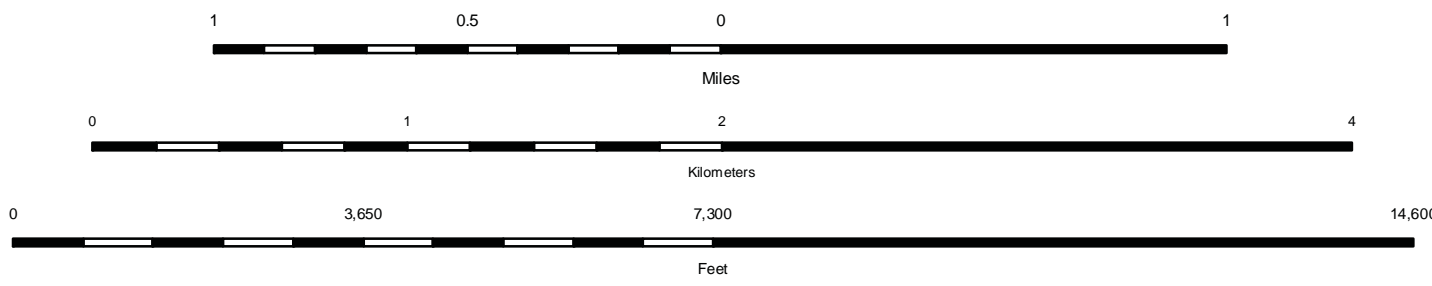
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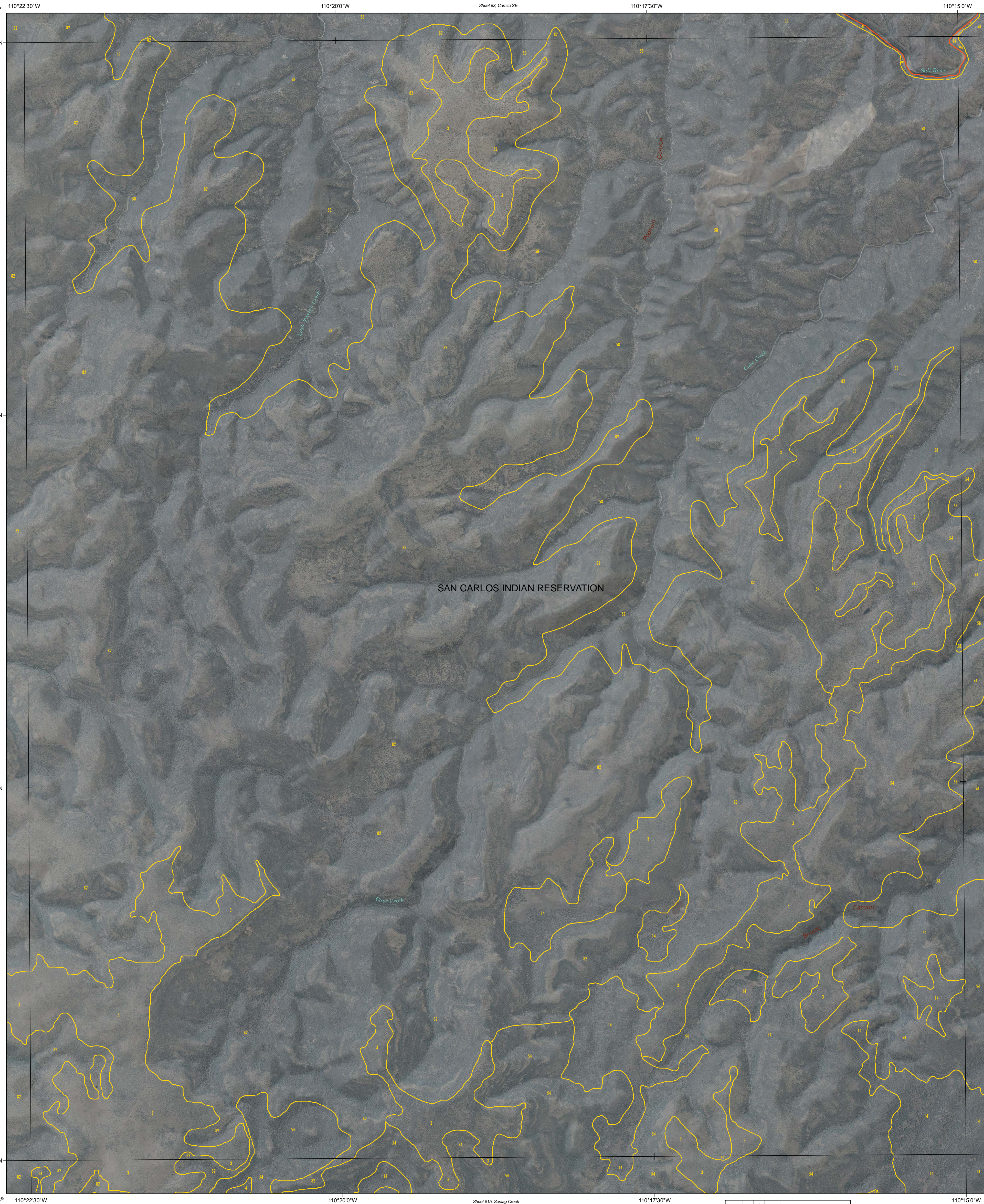


This soil survey was compiled by the U.S. Department of Agriculture, Natural Resources Conservation Service. Base maps are orthophotographs prepared by the U.S. Department of the Interior, Geological Survey, from 2005 - 2008 aerial photography. Culture information was acquired from USGS topo maps and other sources. Hydro information was derived from USGS topo maps and orthophotography. Cultural features and hydro were edited to conform with features represented on the publication orthophotography and to enhance the clarity of the soils information.

North American Datum of 1983 (NAD83).

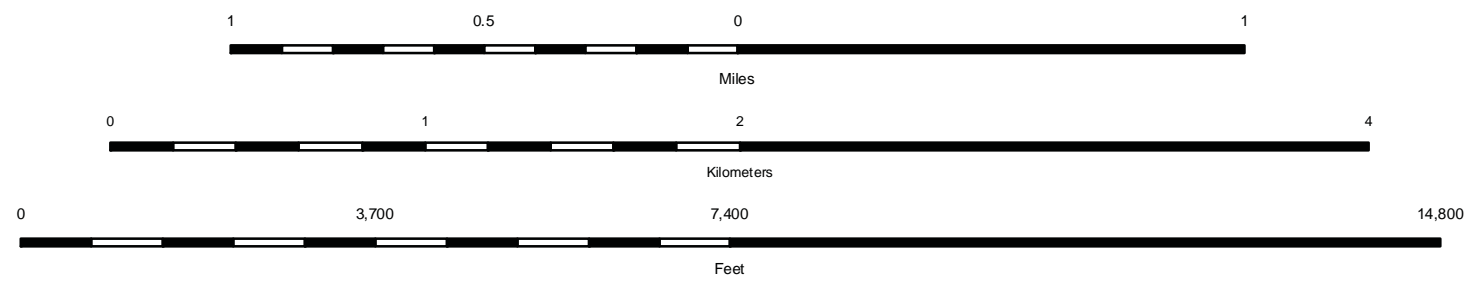


SAN CARLOS INDIAN
RESERVATION, ARIZONA,
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AND GRAHAM COUNTIES
SHEET 6 OF 72

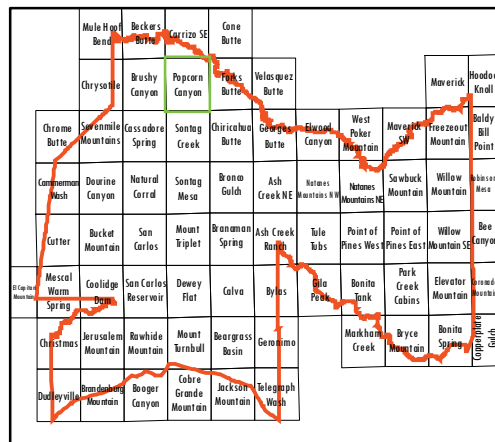


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North American Datum of 1983 (NAD83).



SCALE 1:24000



SAN CARLOS INDIAN
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AND GRAHAM COUNTIES
SHEET 7 OF 72

Sheet #3, Curcio SE

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NATURAL RESOURCES CONSERVATION SERVICE

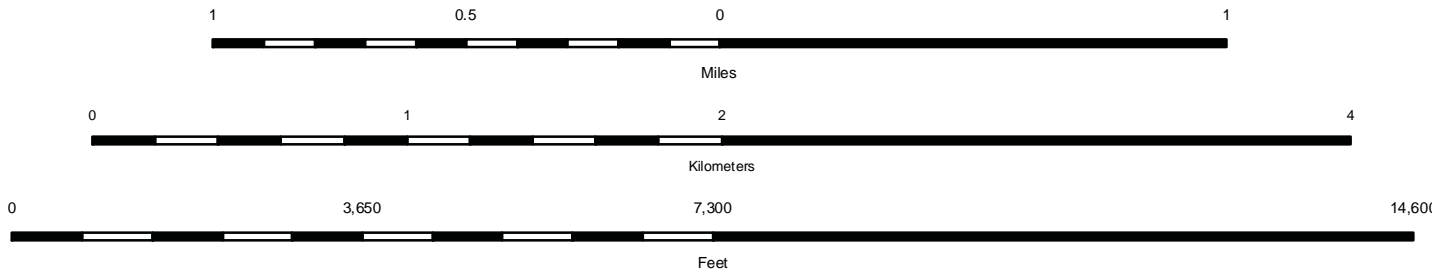
SAN CARLOS INDIAN RESERVATION, ARIZONA,
PARTS OF GILA AND GRAHAM COUNTIES
FORKS BUTTE QUADRANGLE
SHEET 8 OF 72



Sheet #16, Spring Creek

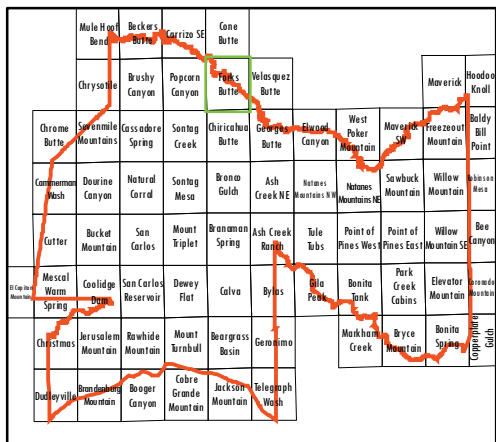
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North American Datum of 1983 (NAD83).



Sheet #16, Chiricahua Butte

Sheet #17, George Butte



SAN CARLOS INDIAN
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Sheet #5, Murguez Butte

Sheet #17, George Butte

Sheet #4, Crown Butte

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NATURAL RESOURCES CONSERVATION SERVICE

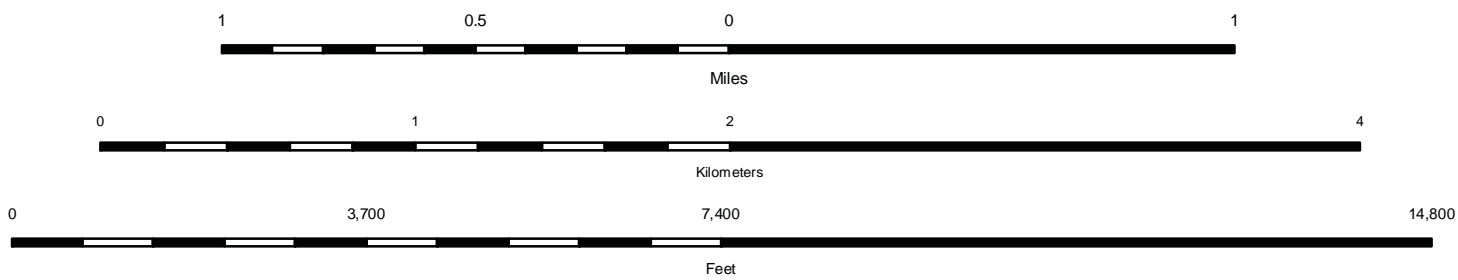
SAN CARLOS INDIAN RESERVATION, ARIZONA,
PARTS OF GILA AND GRAHAM COUNTIES
VELASQUEZ BUTTE QUADRANGLE
SHEET 9 OF 72



Sheet #16, Chiricahua Butte

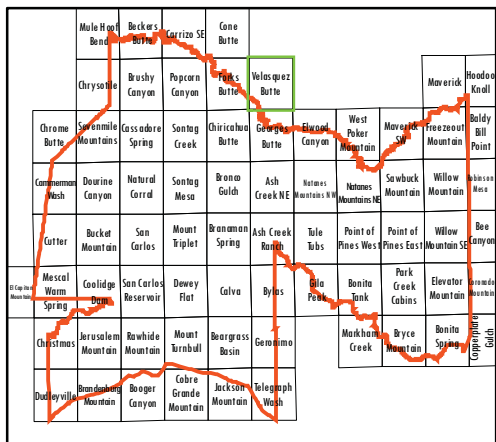
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North American Datum of 1983 (NAD83).



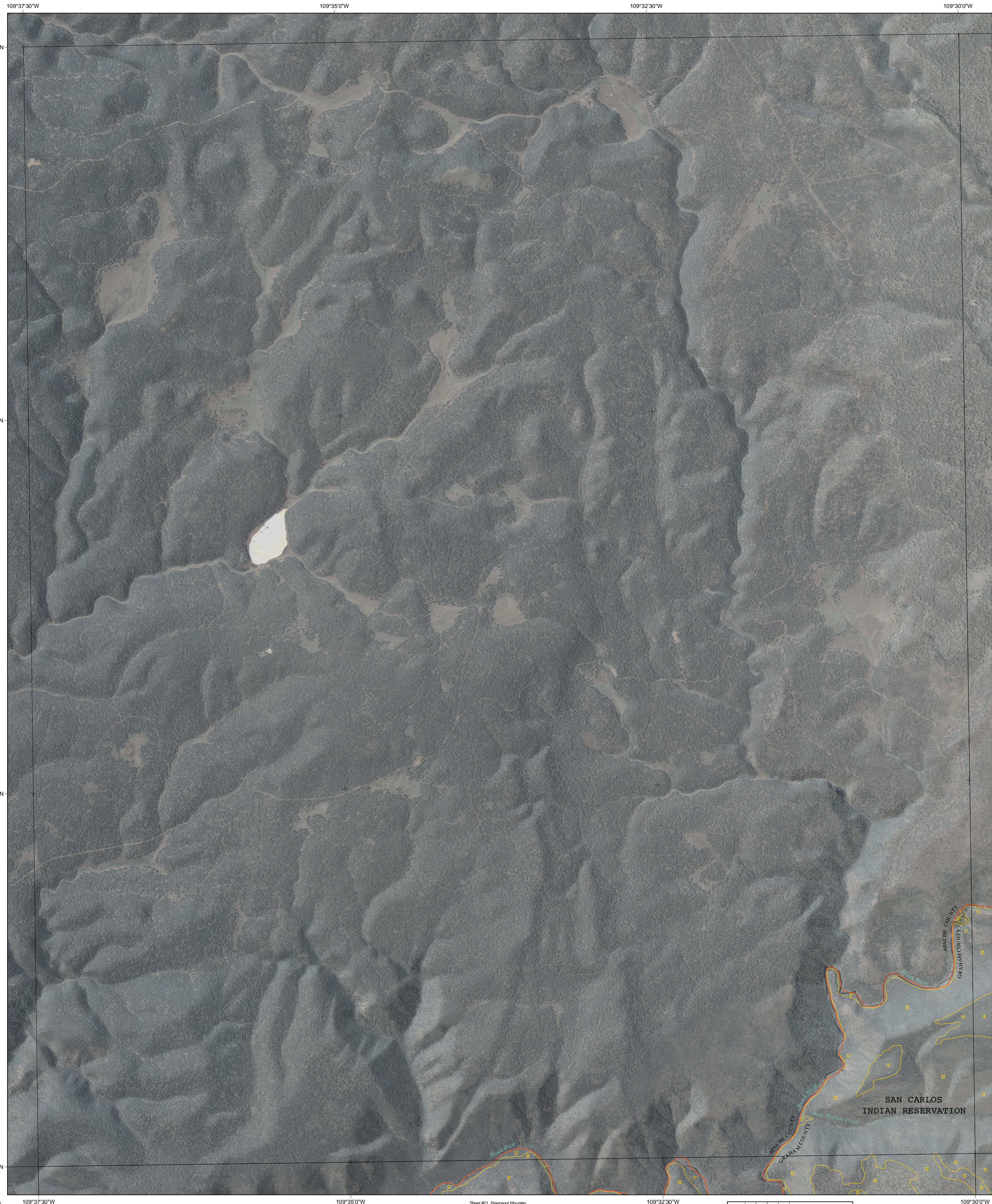
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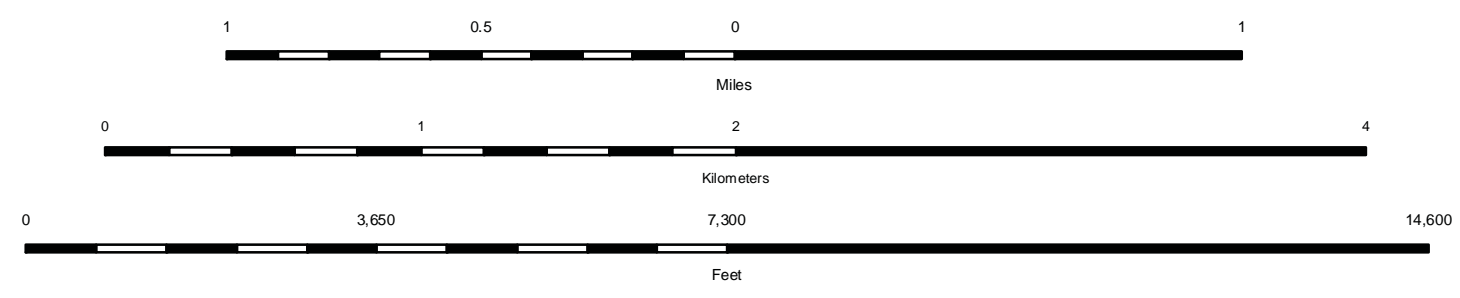
SAN CARLOS INDIAN
RESERVATION, ARIZONA,
PARTS OF GILA
AND GRAHAM COUNTIES
SHEET 9 OF 72

Sheet #18, Elmore Canyon

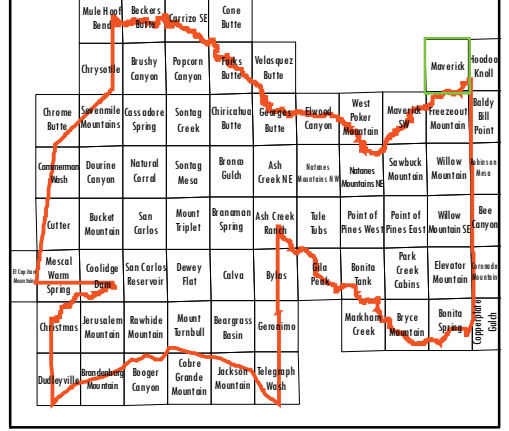


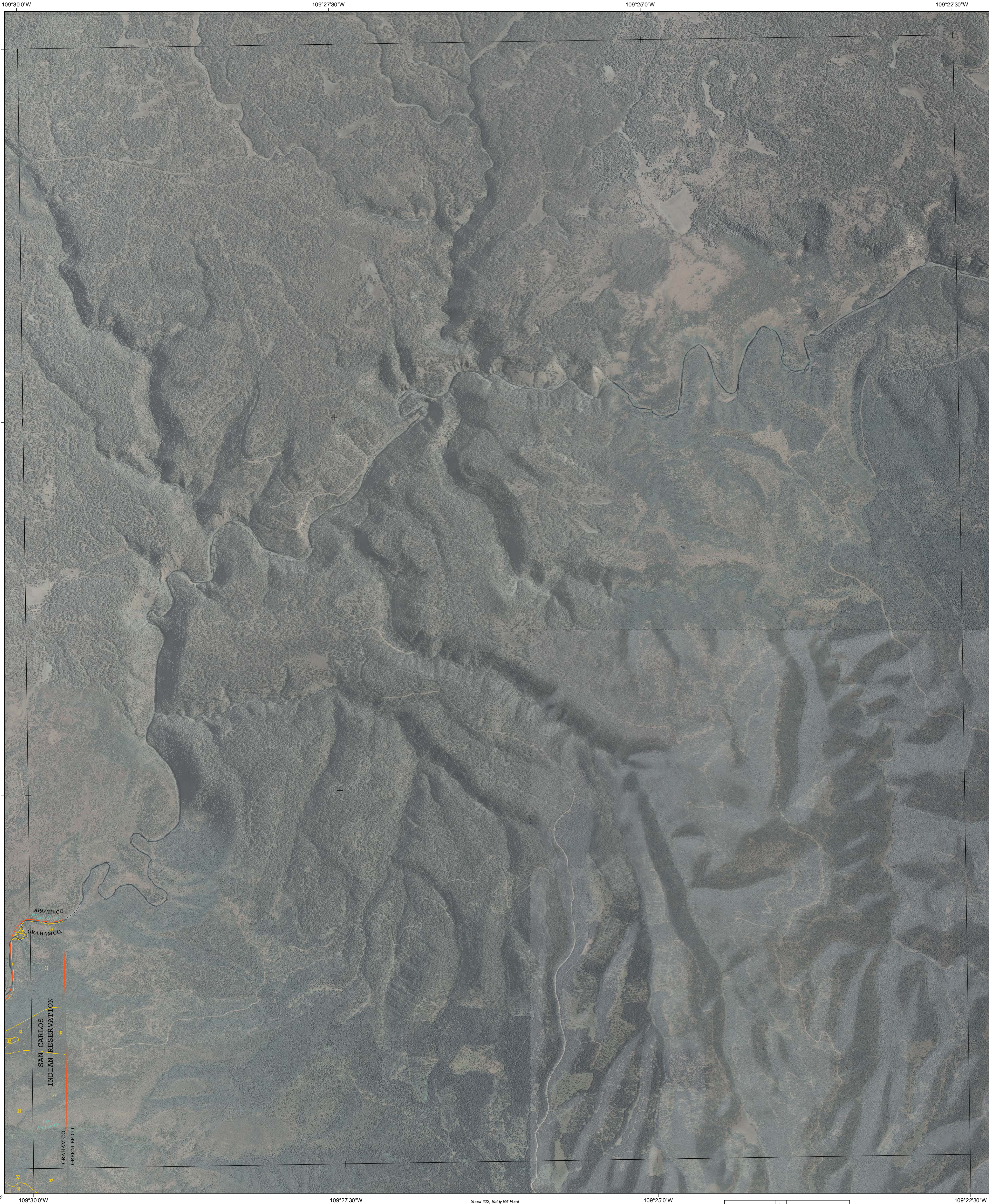
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North American Datum of 1983 (NAD83).



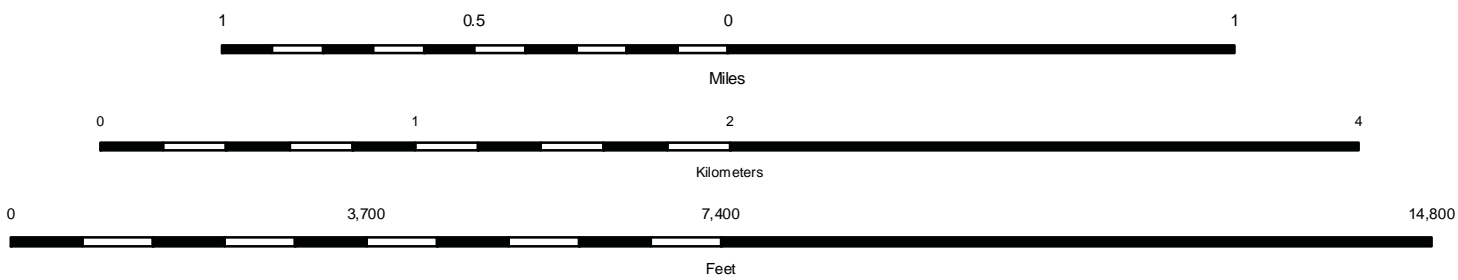
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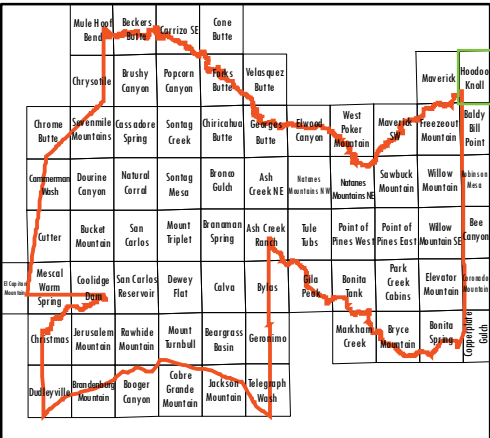


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North American Datum of 1983 (NAD83).



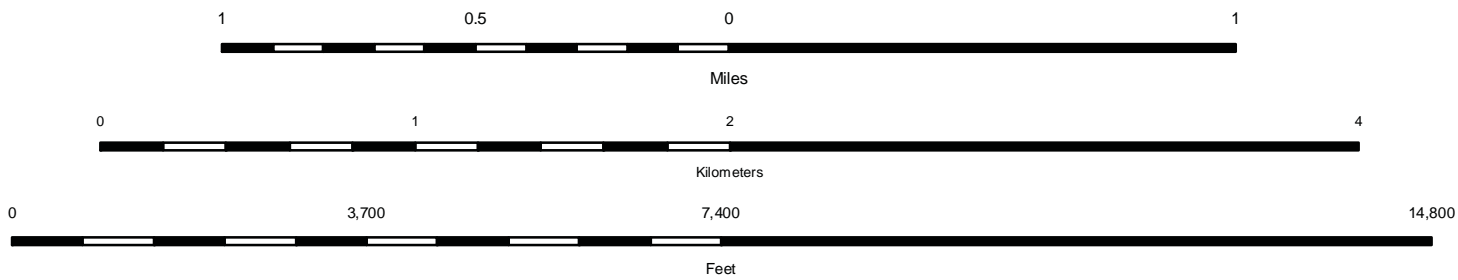
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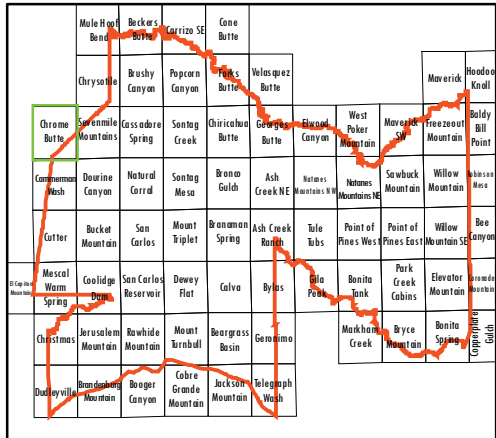


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North American Datum of 1983 (NAD83).



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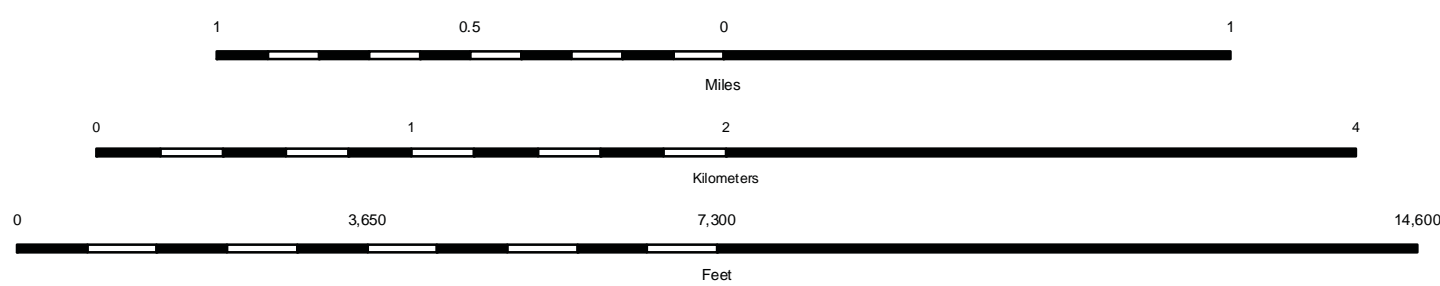


SAN CARLOS INDIAN
RESERVATION, ARIZONA,
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AND GRAHAM COUNTIES
SHEET 12 OF 72

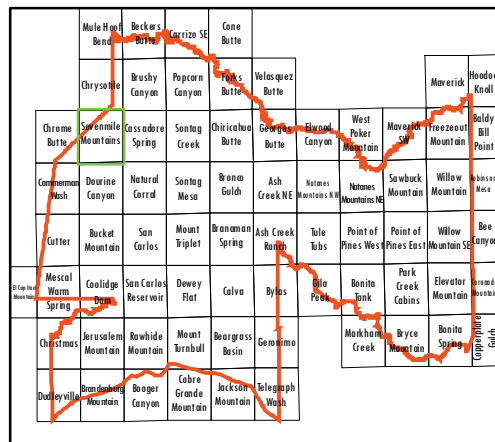


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North American Datum of 1983 (NAD83).



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SAN CARLOS INDIAN
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AND GRAHAM COUNTIES
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110°30'0"W 110°27'30"W 110°25'0"W 110°22'30"W

33°37'30"N

33°37'30"N

33°35'0"N

33°35'0"N

33°32'30"N

33°32'30"N

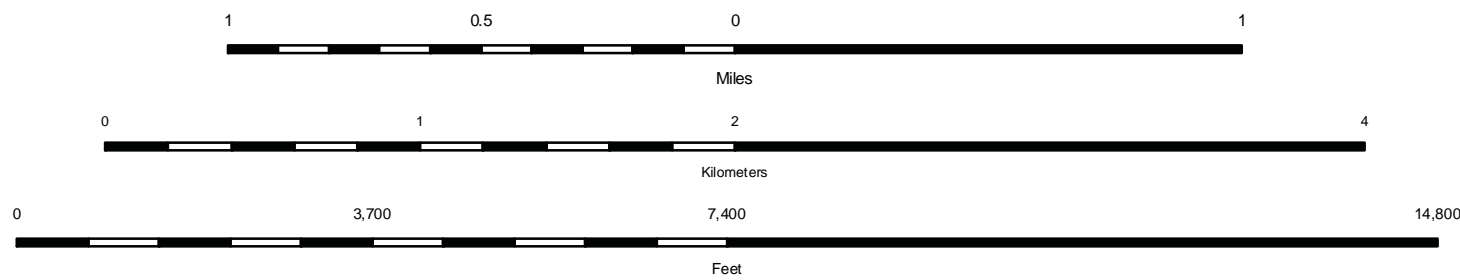
33°30'0"N

33°30'0"N

110°30'0"W 110°27'30"W 110°25'0"W 110°22'30"W

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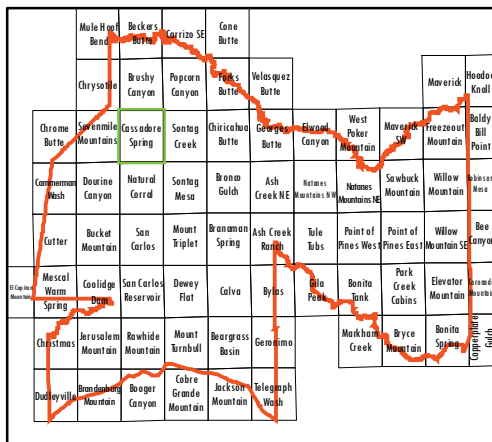
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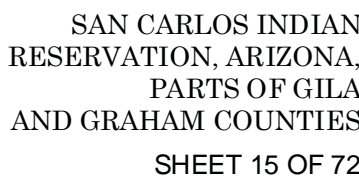
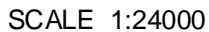
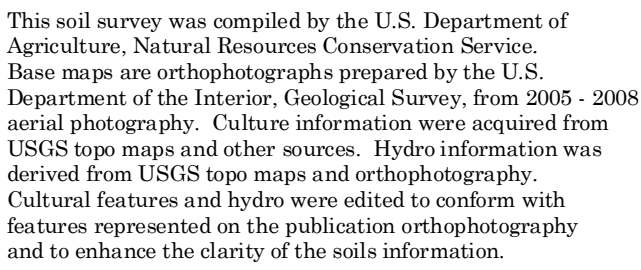
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SAN CARLOS
INDIAN RESERVATION

Bear Canyon
Junction



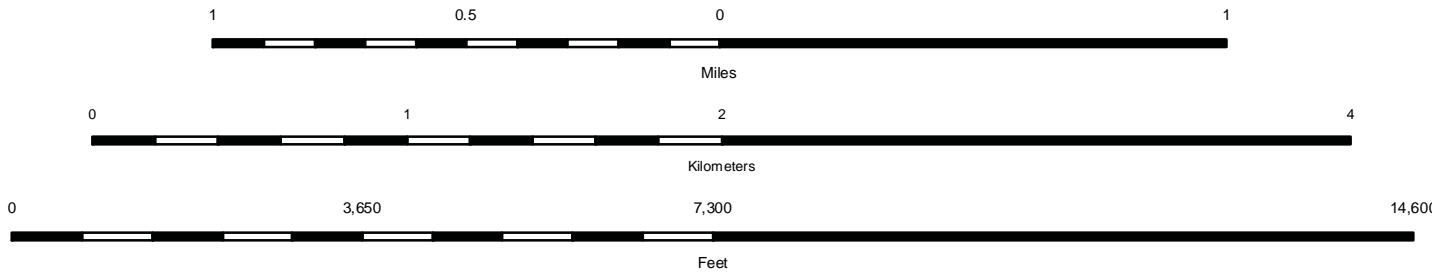
SAN CARLOS INDIAN
RESERVATION, ARIZONA,
PARTS OF GILA
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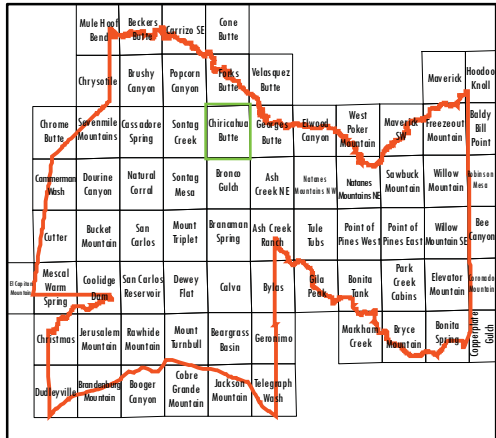


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North American Datum of 1983 (NAD83).



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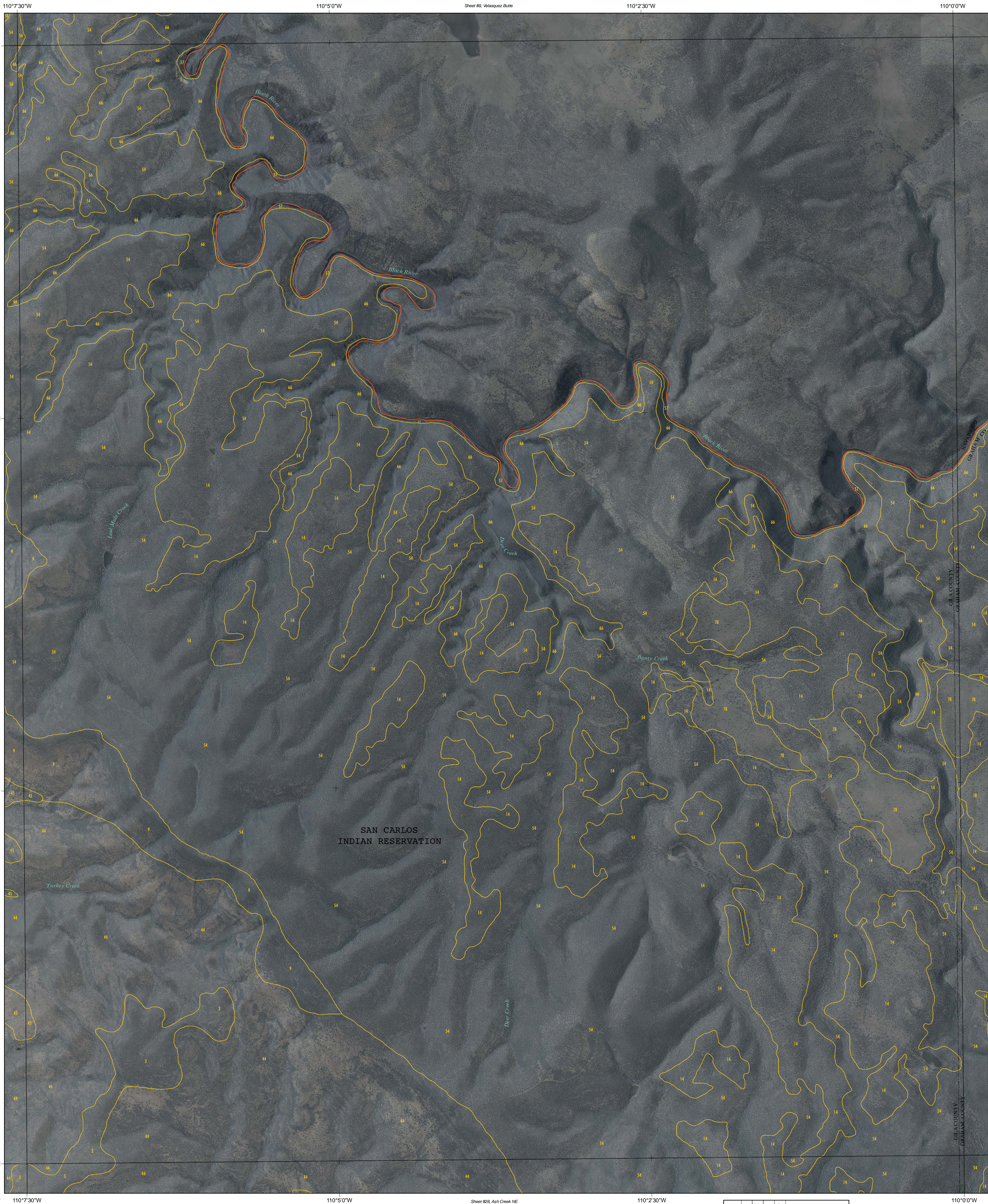


SAN CARLOS INDIAN
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Sheet #16, Pecos River
Sheet #16, Chinichua Butte
Sheet #27, Bonito Canyon
Sheet #28, Ash Creek NE
Sheet #29, Velasquez Butte
Sheet #30, Elmer's Canyon

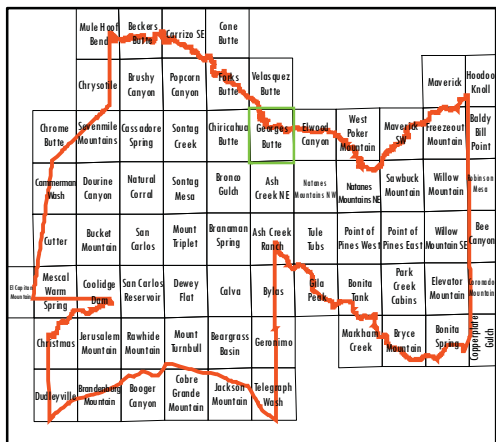
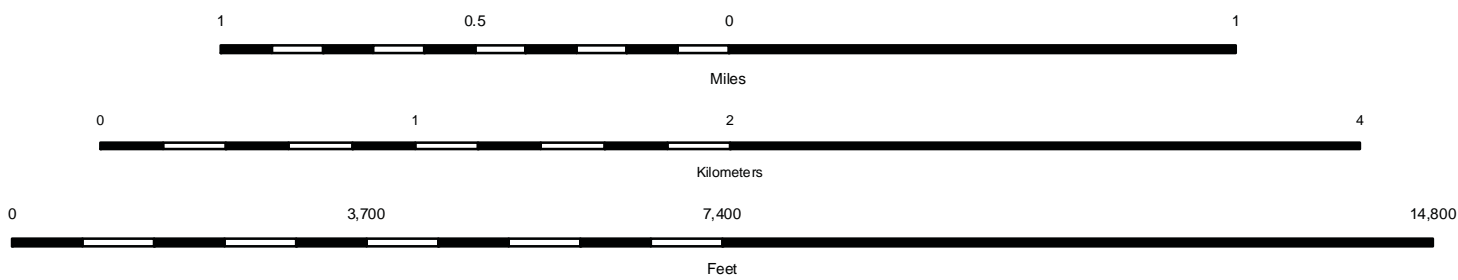
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SAN CARLOS INDIAN RESERVATION, ARIZONA,
PARTS OF GILA AND GRAHAM COUNTIES
GEORGES BUTTE QUADRANGLE
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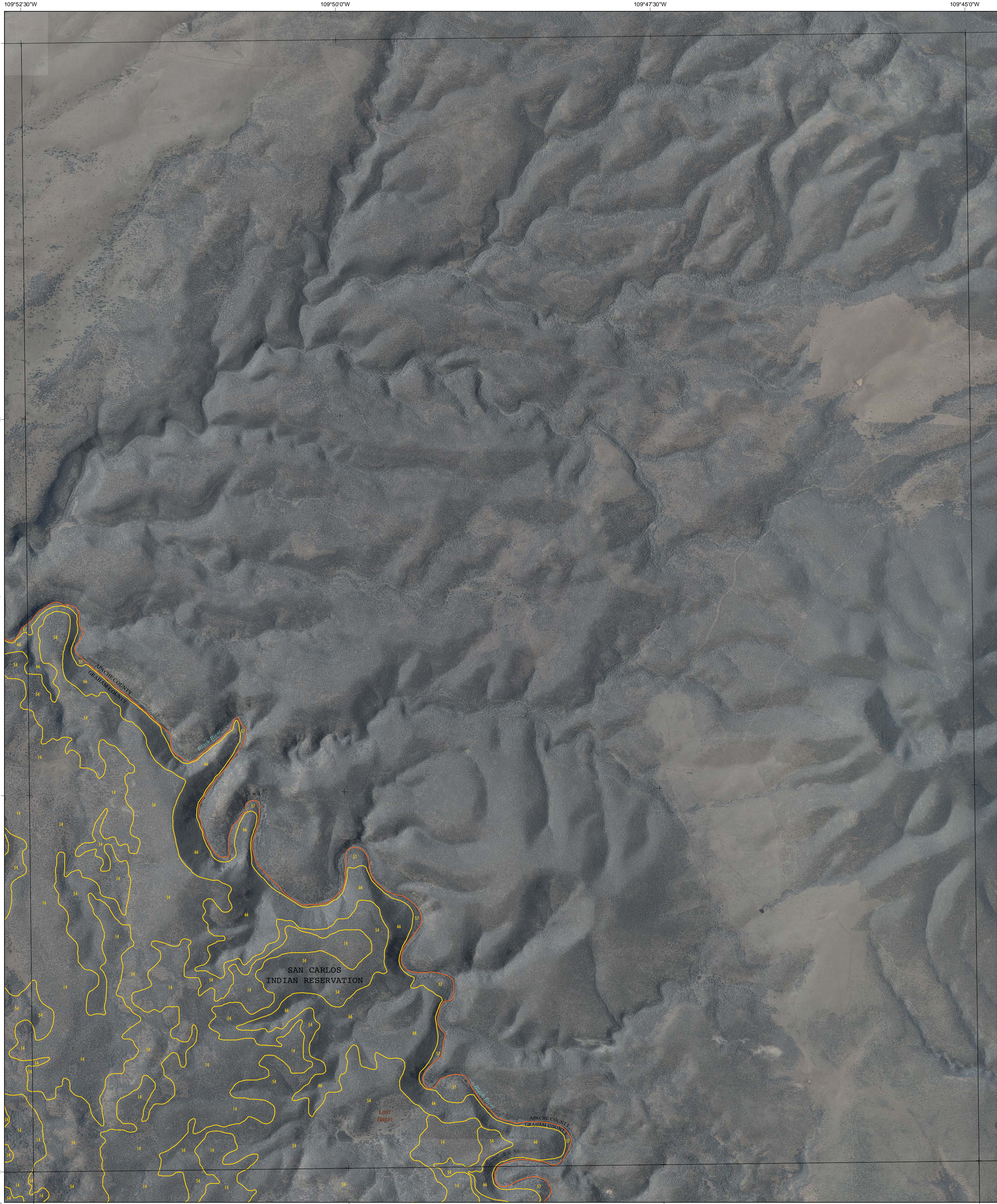


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North American Datum of 1983 (NAD83).

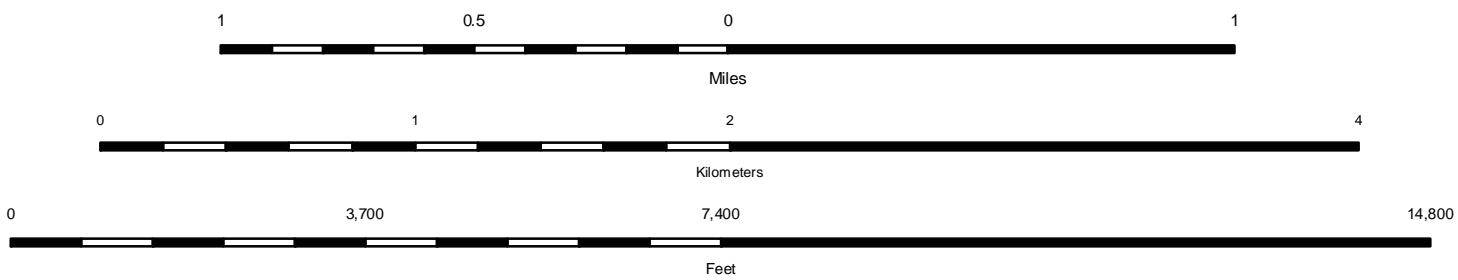


SAN CARLOS INDIAN
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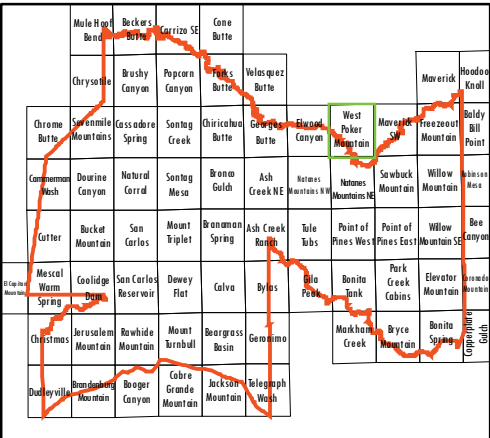


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North American Datum of 1983 (NAD83).

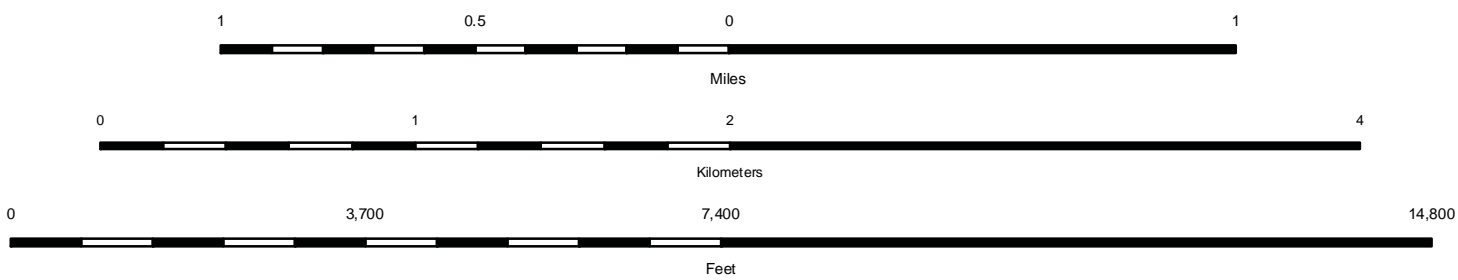


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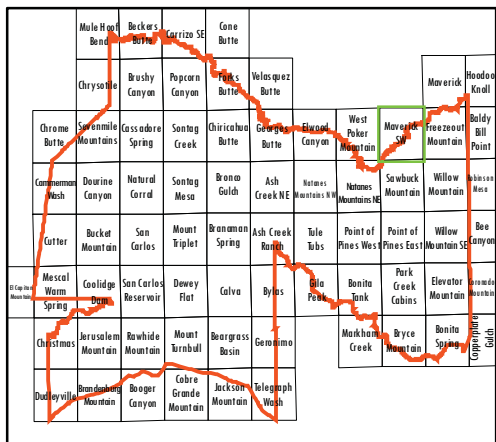


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North American Datum of 1983 (NAD83).



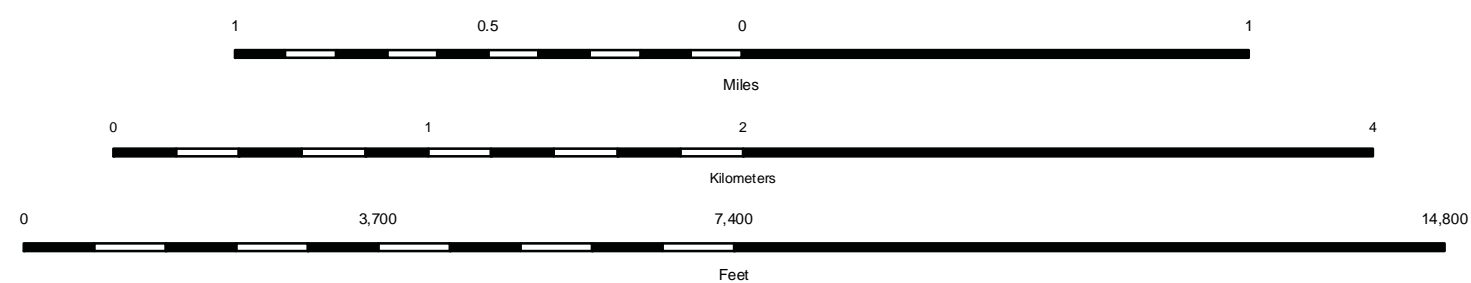
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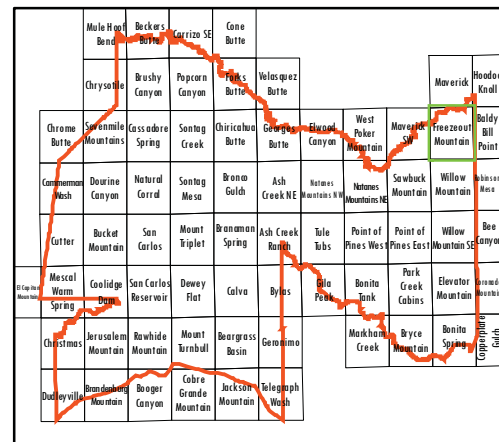


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North American Datum of 1983 (NAD83).



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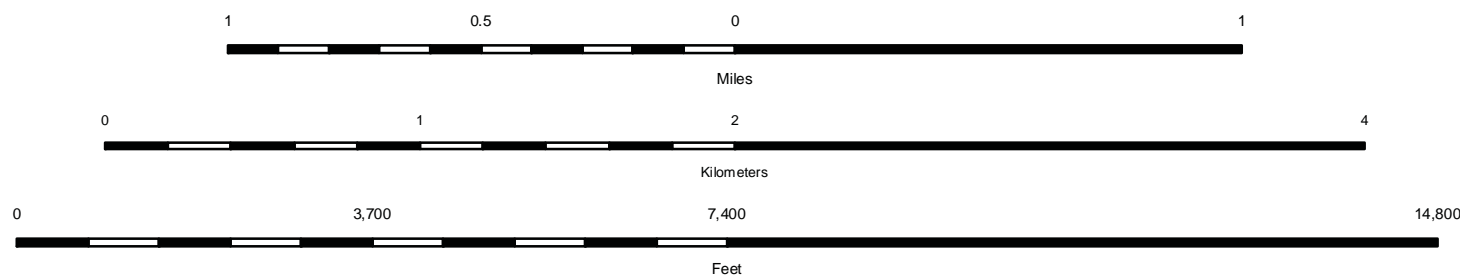
SAN CARLOS INDIAN
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Sheet #10, Ashcroft



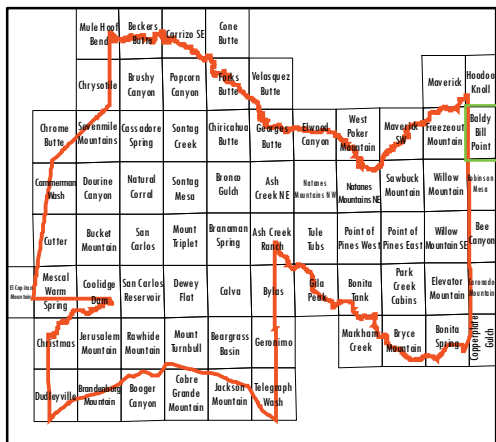
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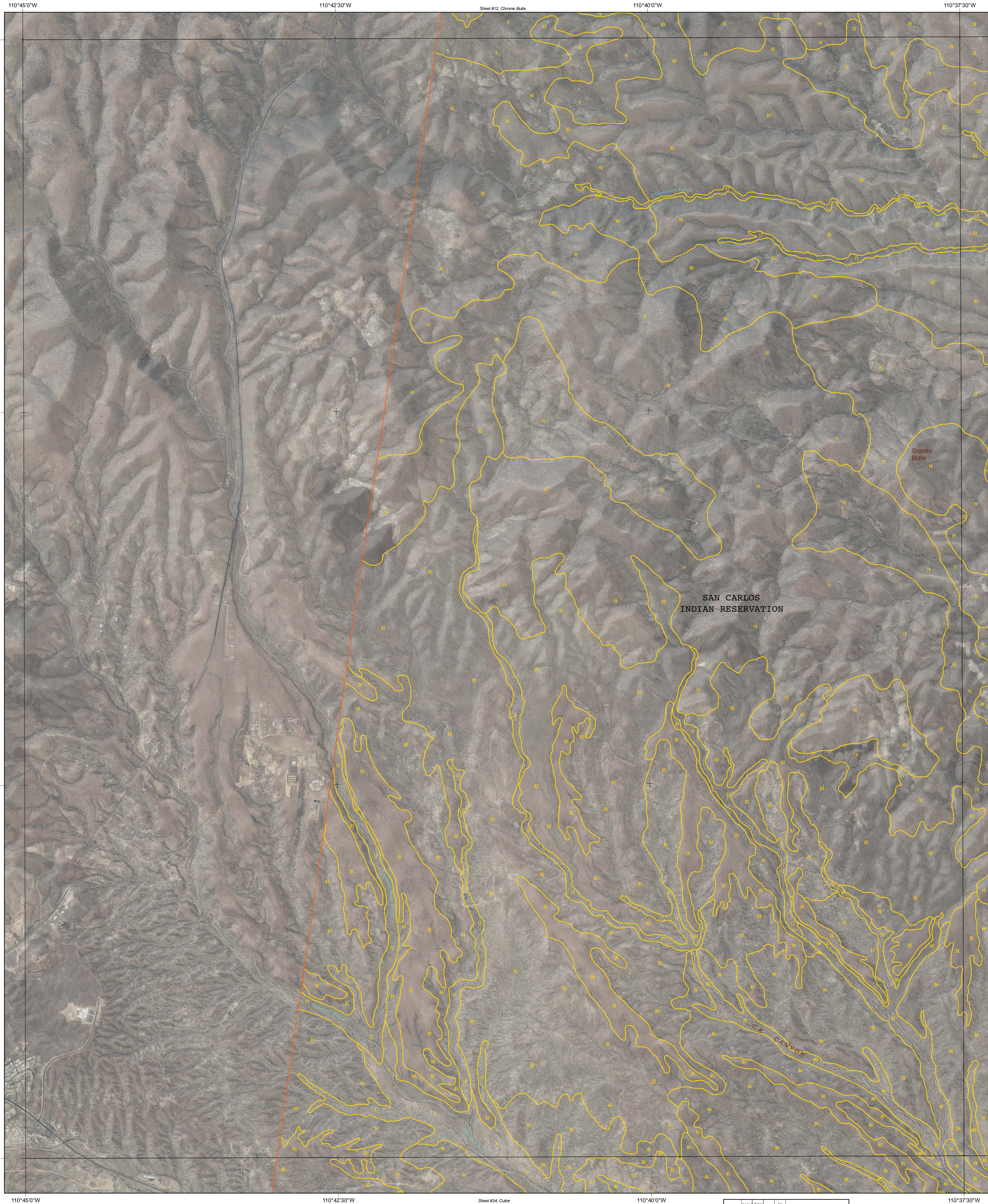
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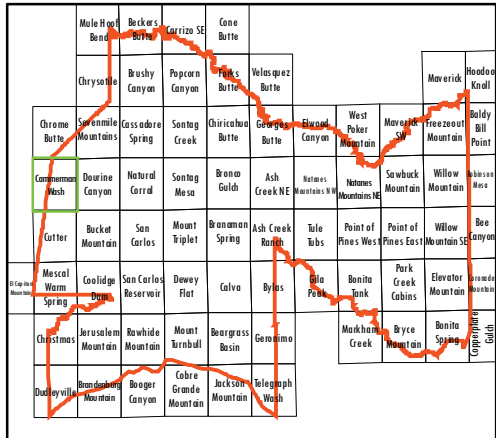
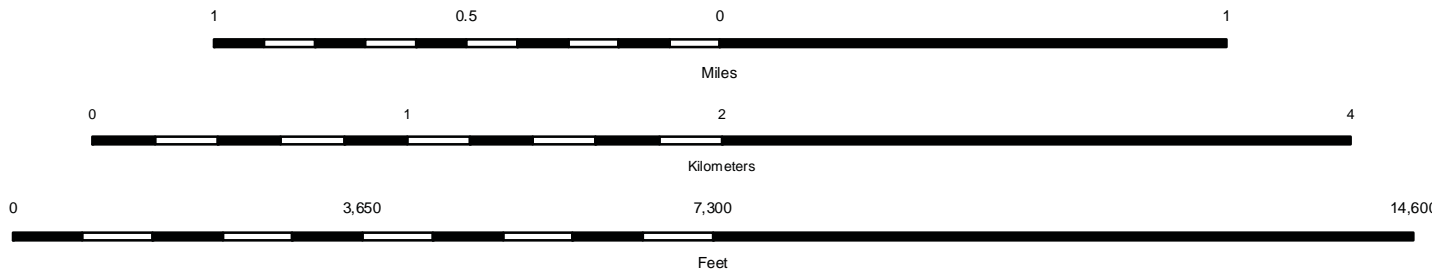
Sheet #33, Robinson Mesa





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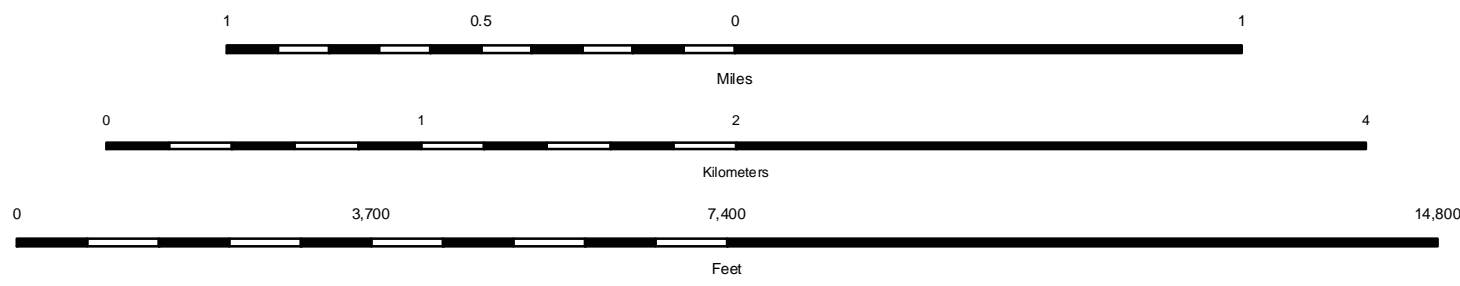
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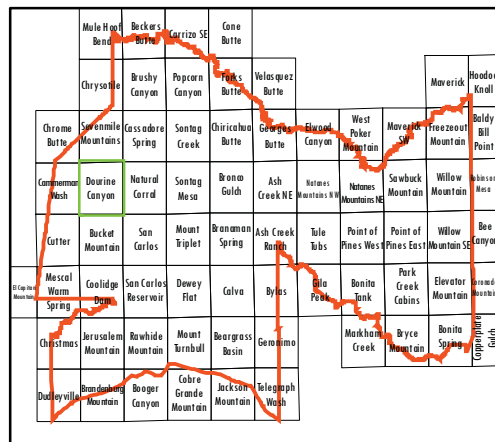


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North American Datum of 1983 (NAD83).



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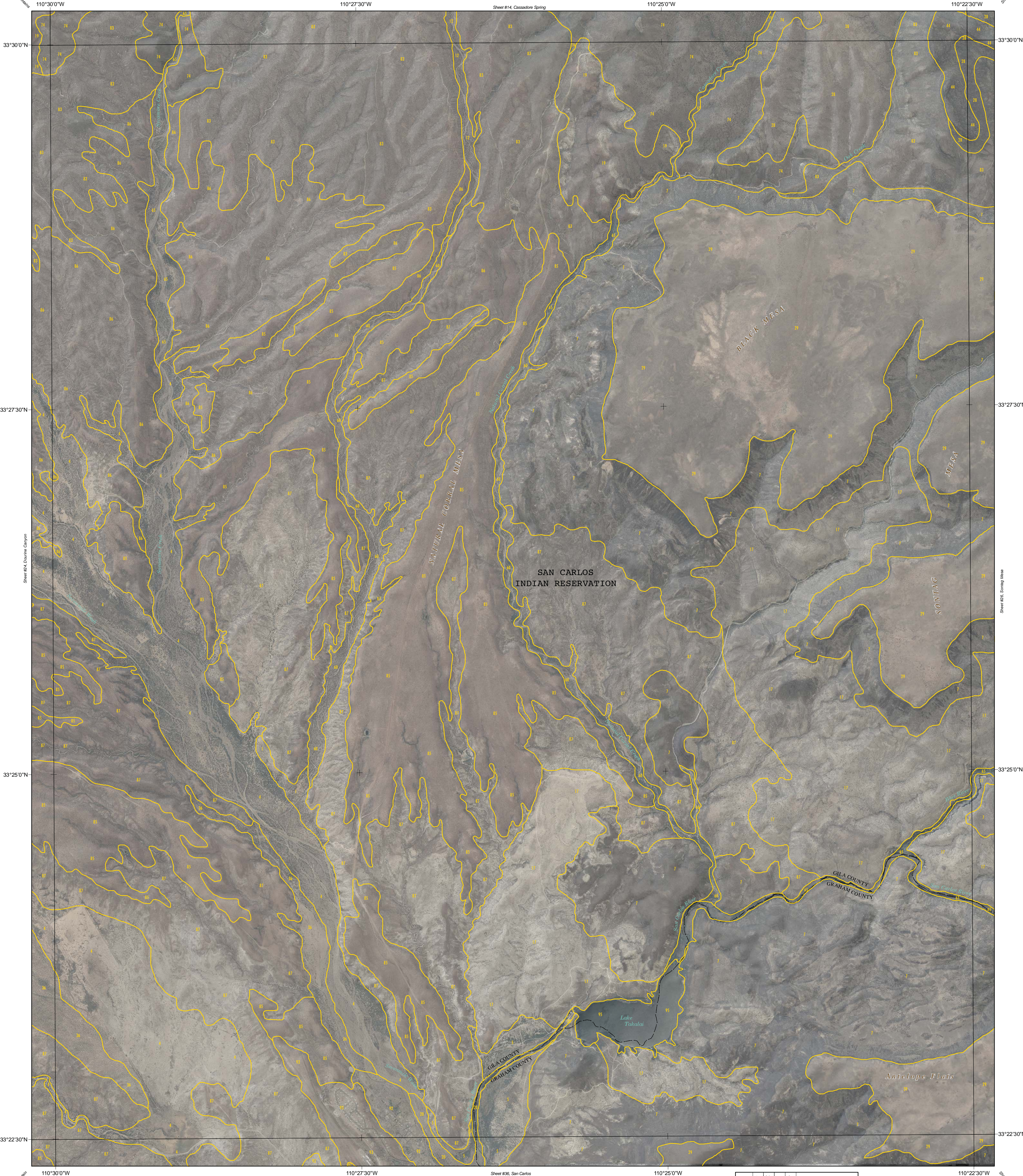
SAN CARLOS INDIAN
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Sheet #13, Severnle Mountains

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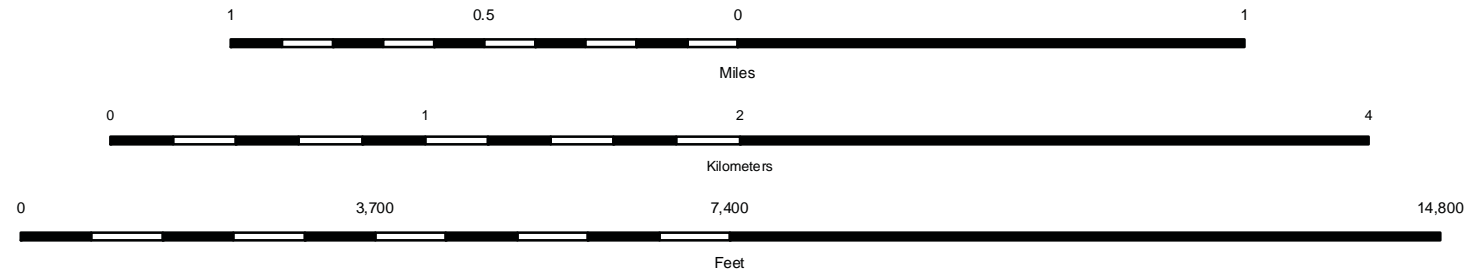
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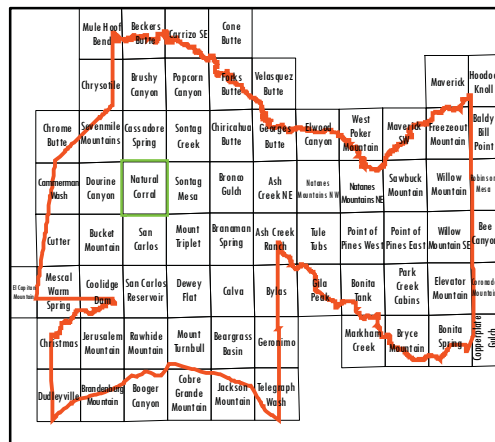
Sheet #15, Santa MESA

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North American Datum of 1983 (NAD83).



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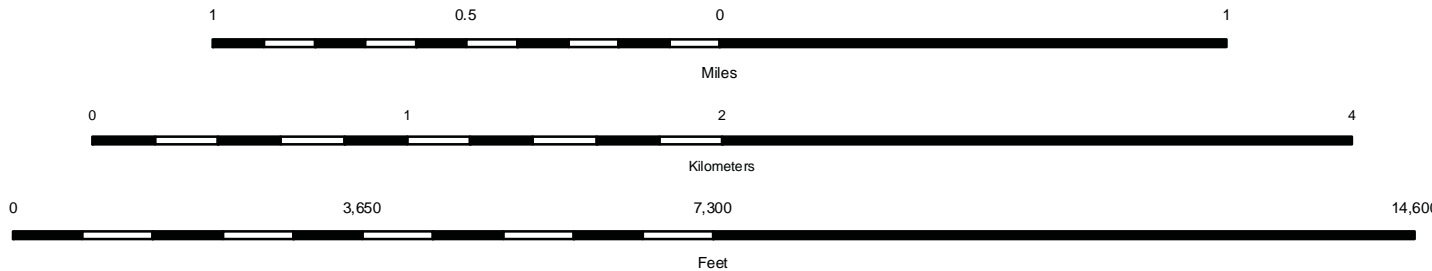
SAN CARLOS INDIAN
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Sheet #17, Adam Taylor

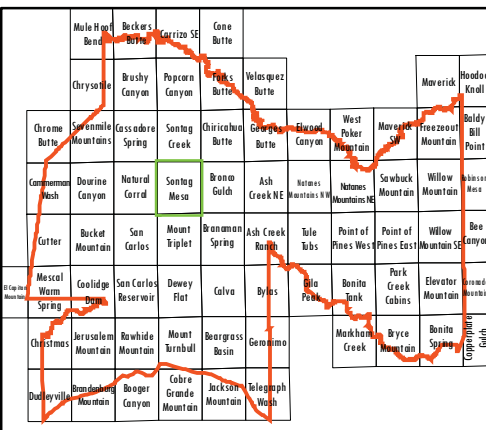


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North American Datum of 1983 (NAD83).



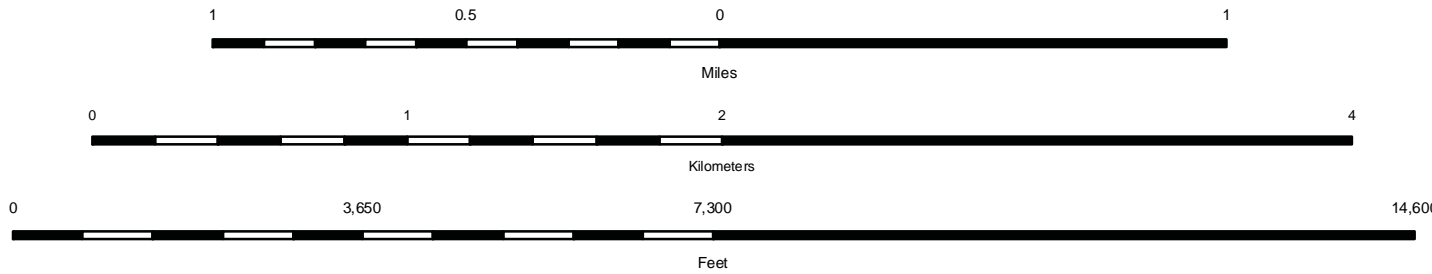
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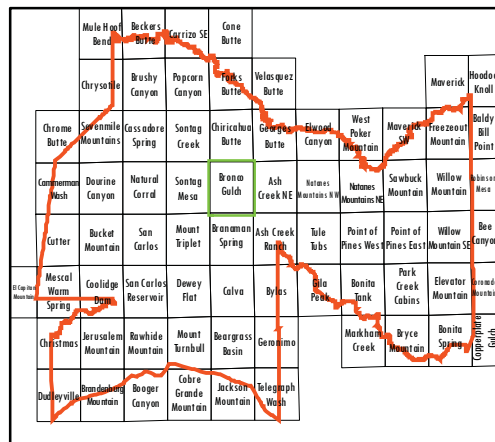


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North American Datum of 1983 (NAD83).



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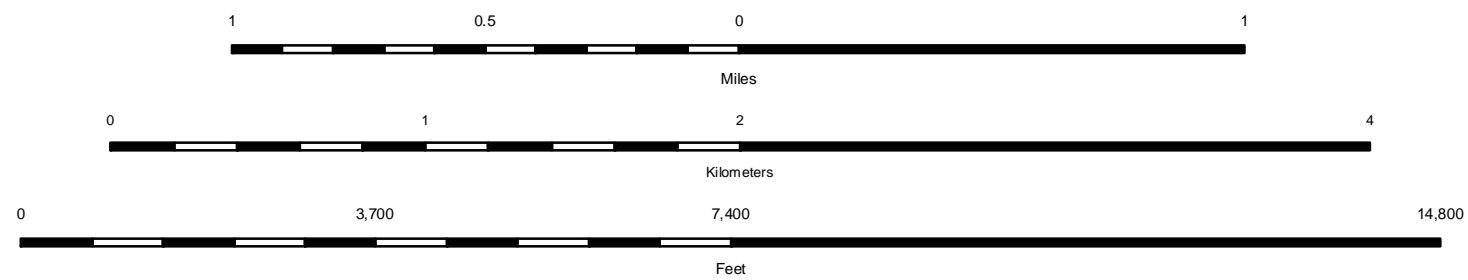


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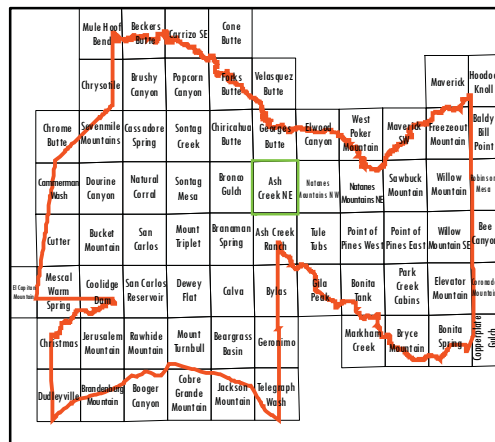


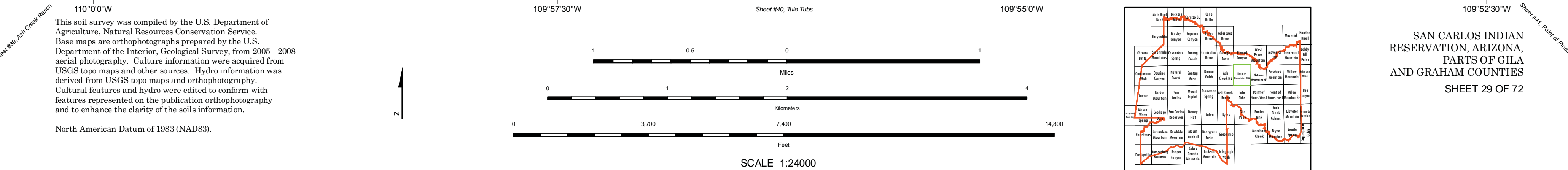
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North American Datum of 1983 (NAD83).



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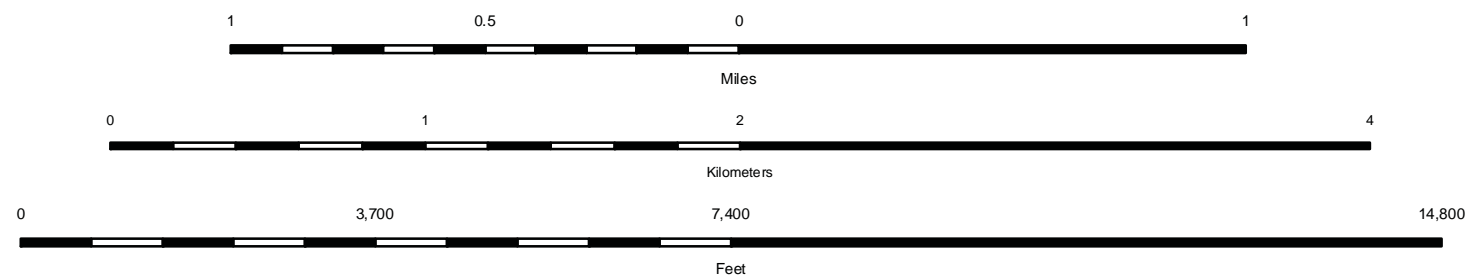




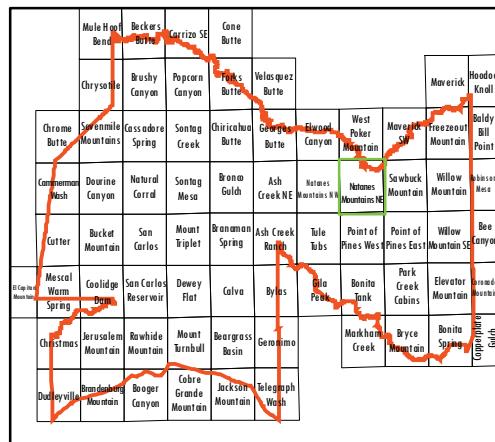


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North American Datum of 1983 (NAD83).



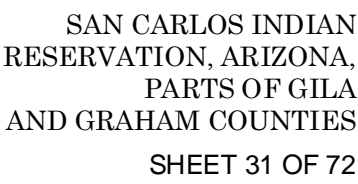
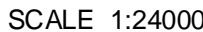
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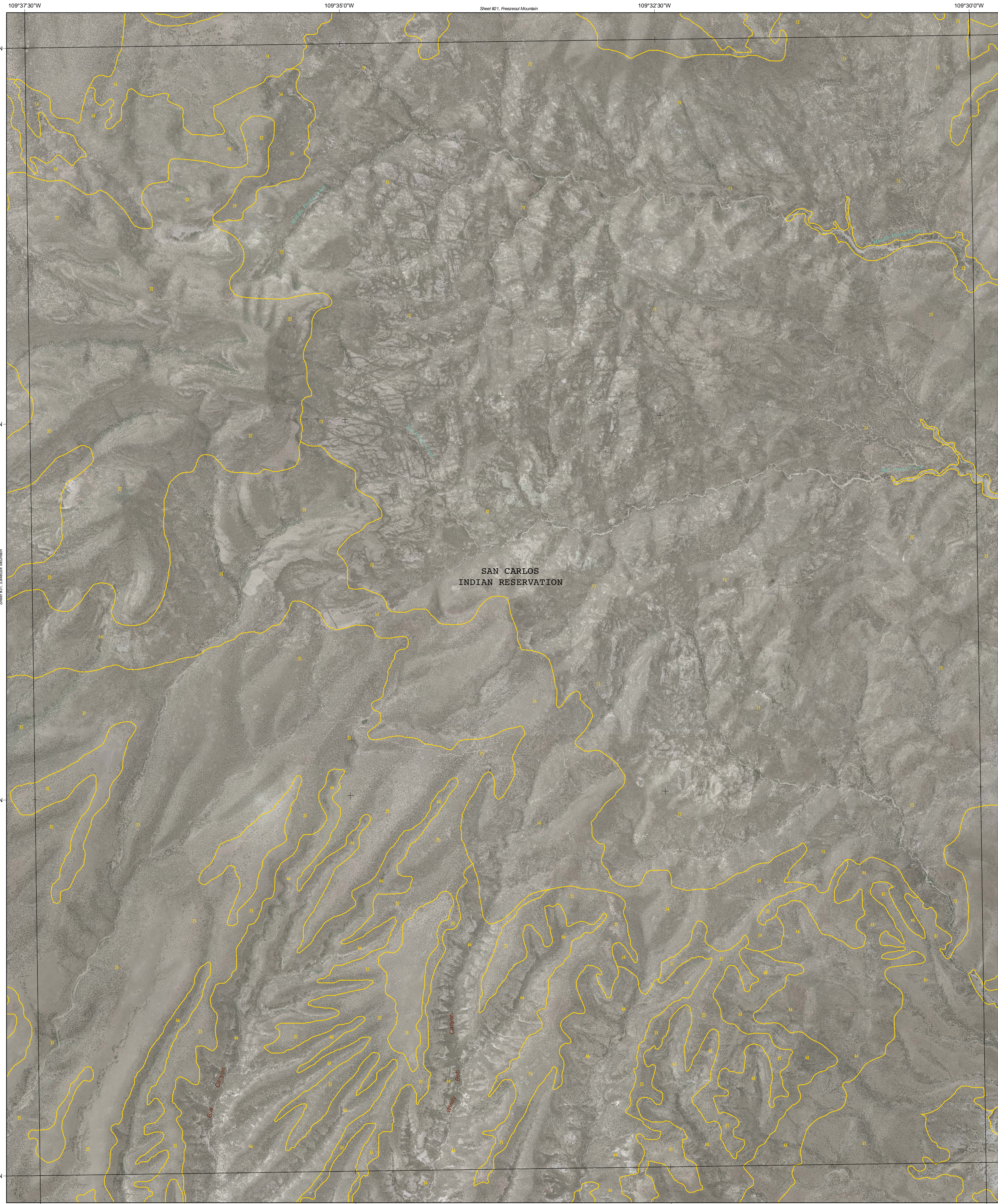


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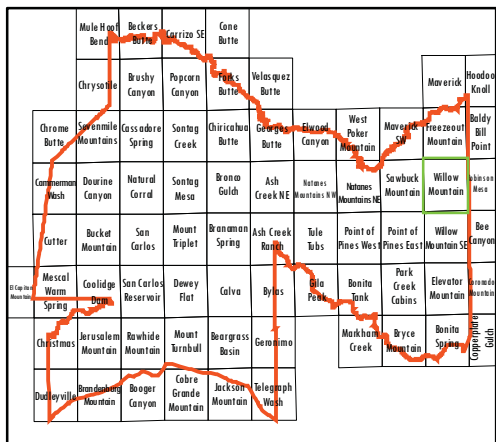
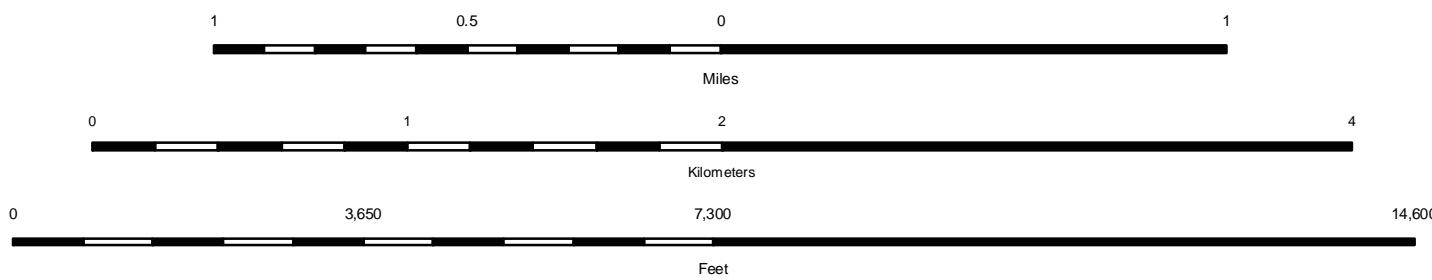
North American Datum of 1983 (NAD83).





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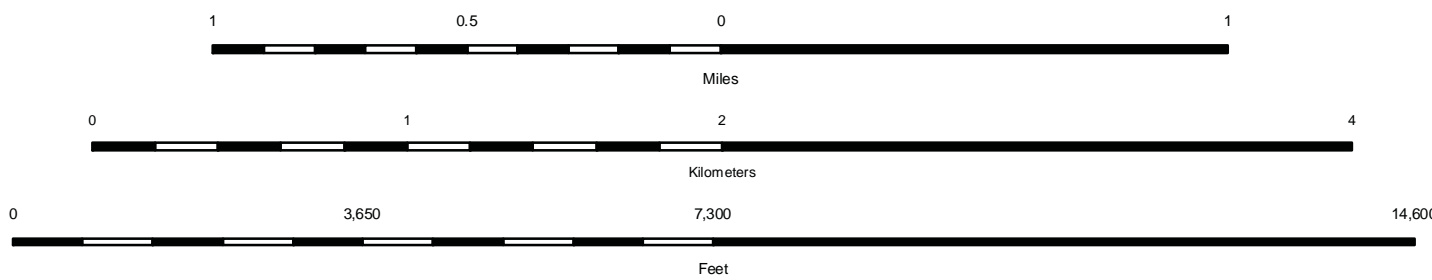
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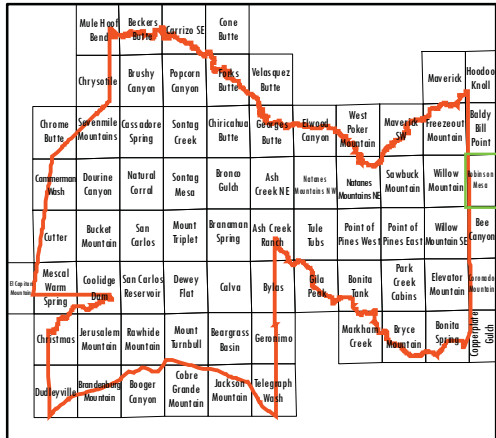


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North American Datum of 1983 (NAD83).



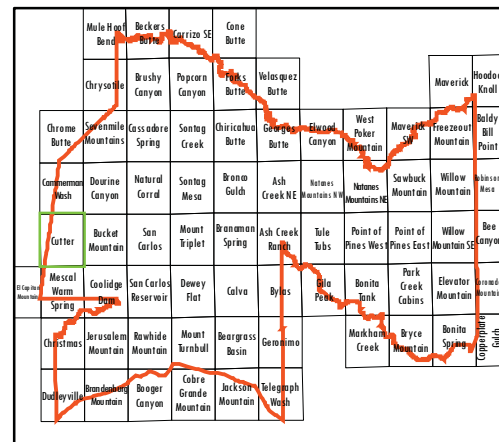
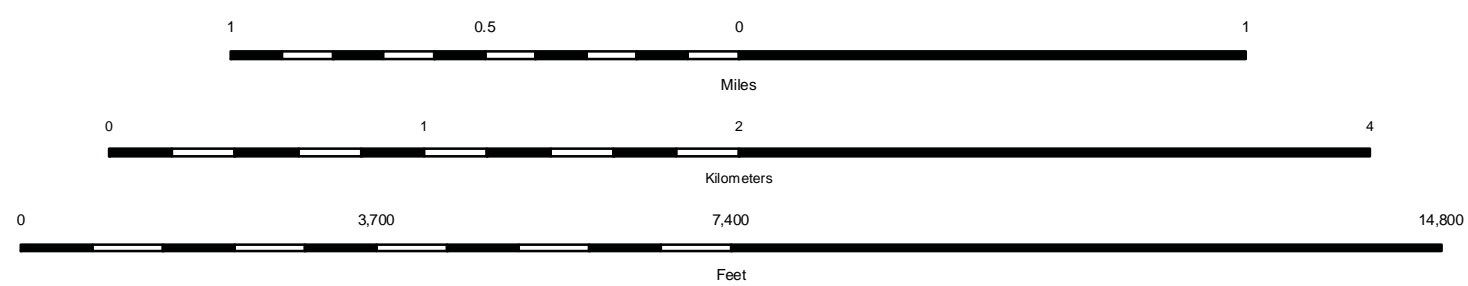
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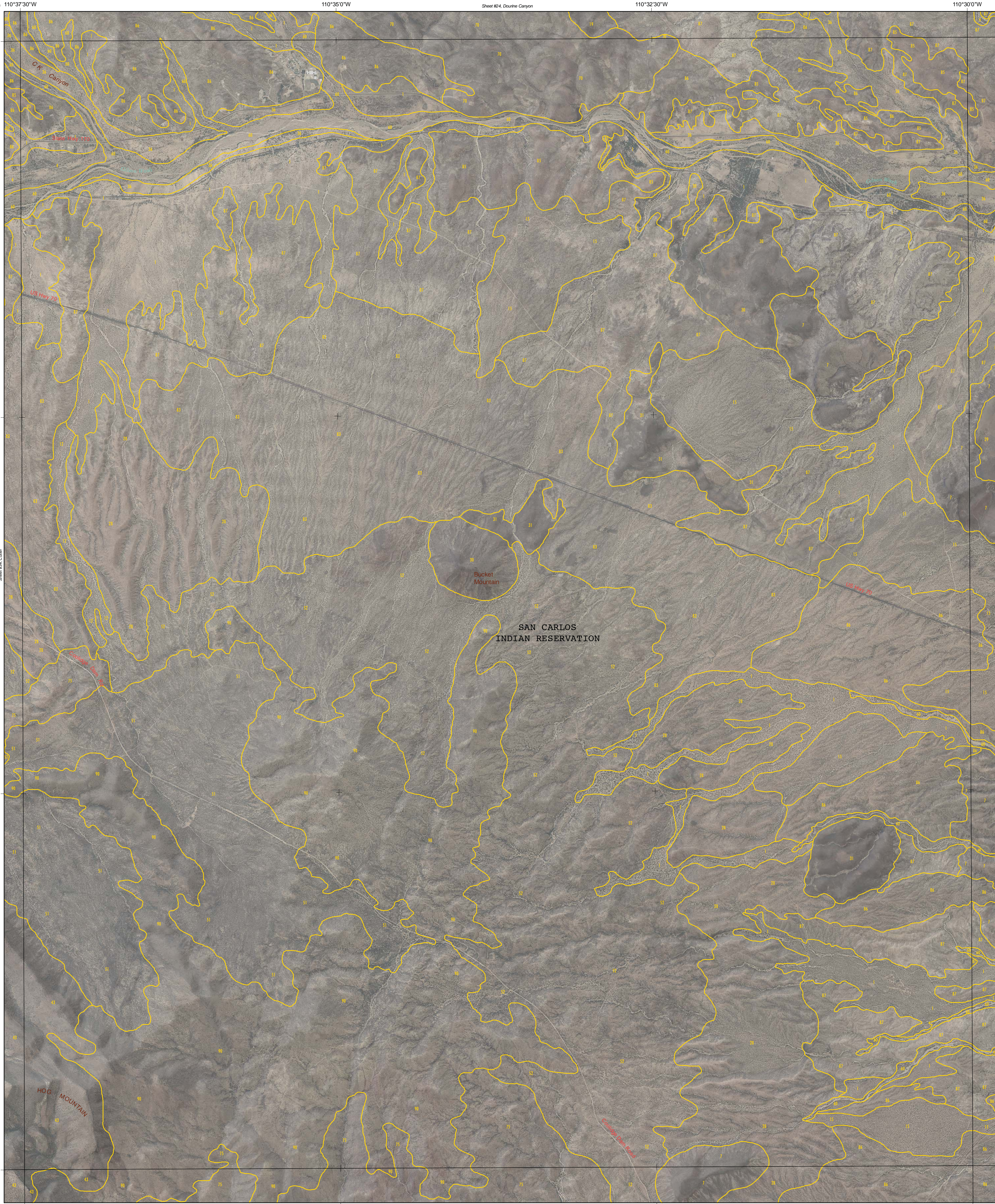




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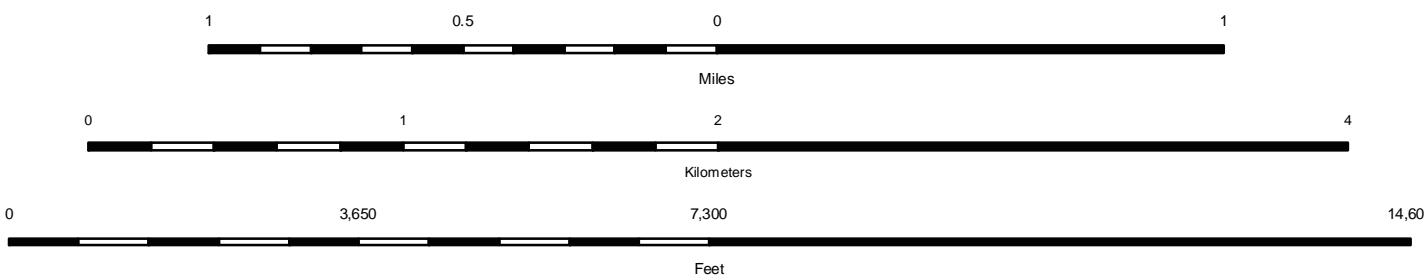
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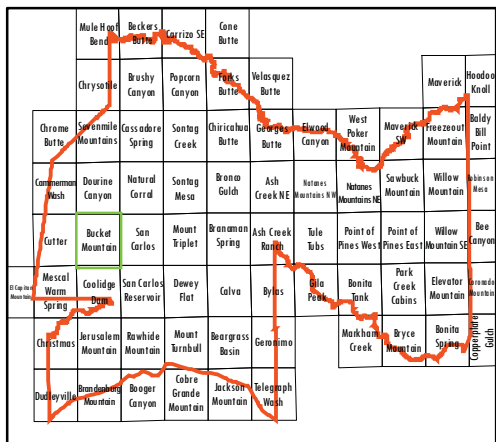


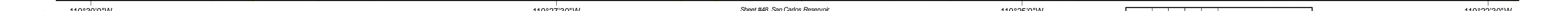
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North American Datum of 1983 (NAD83).

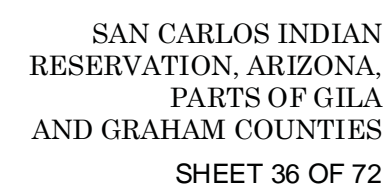
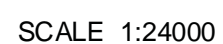


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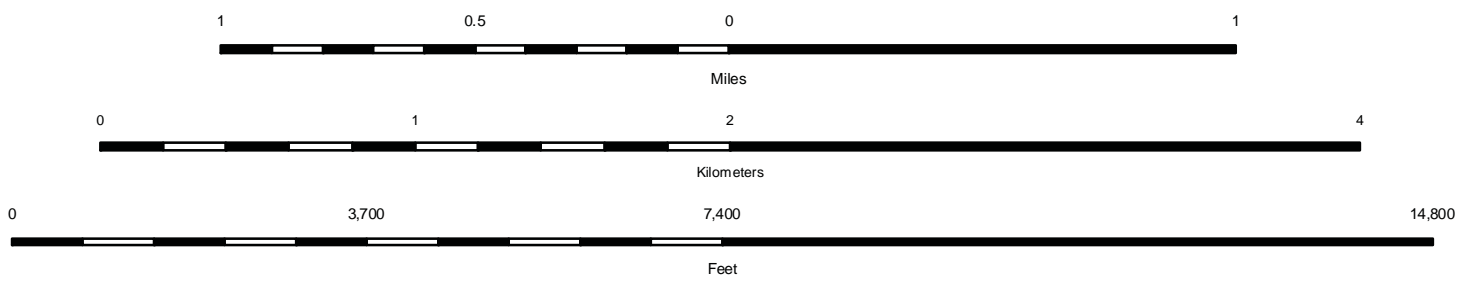
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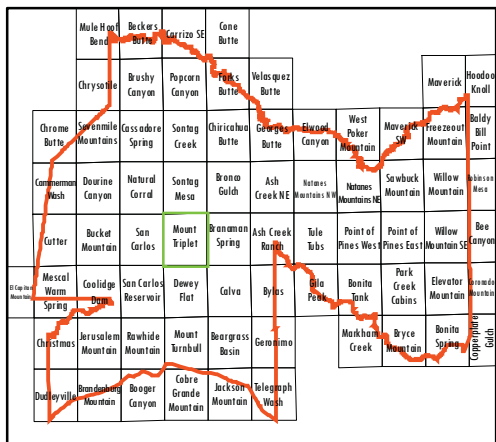


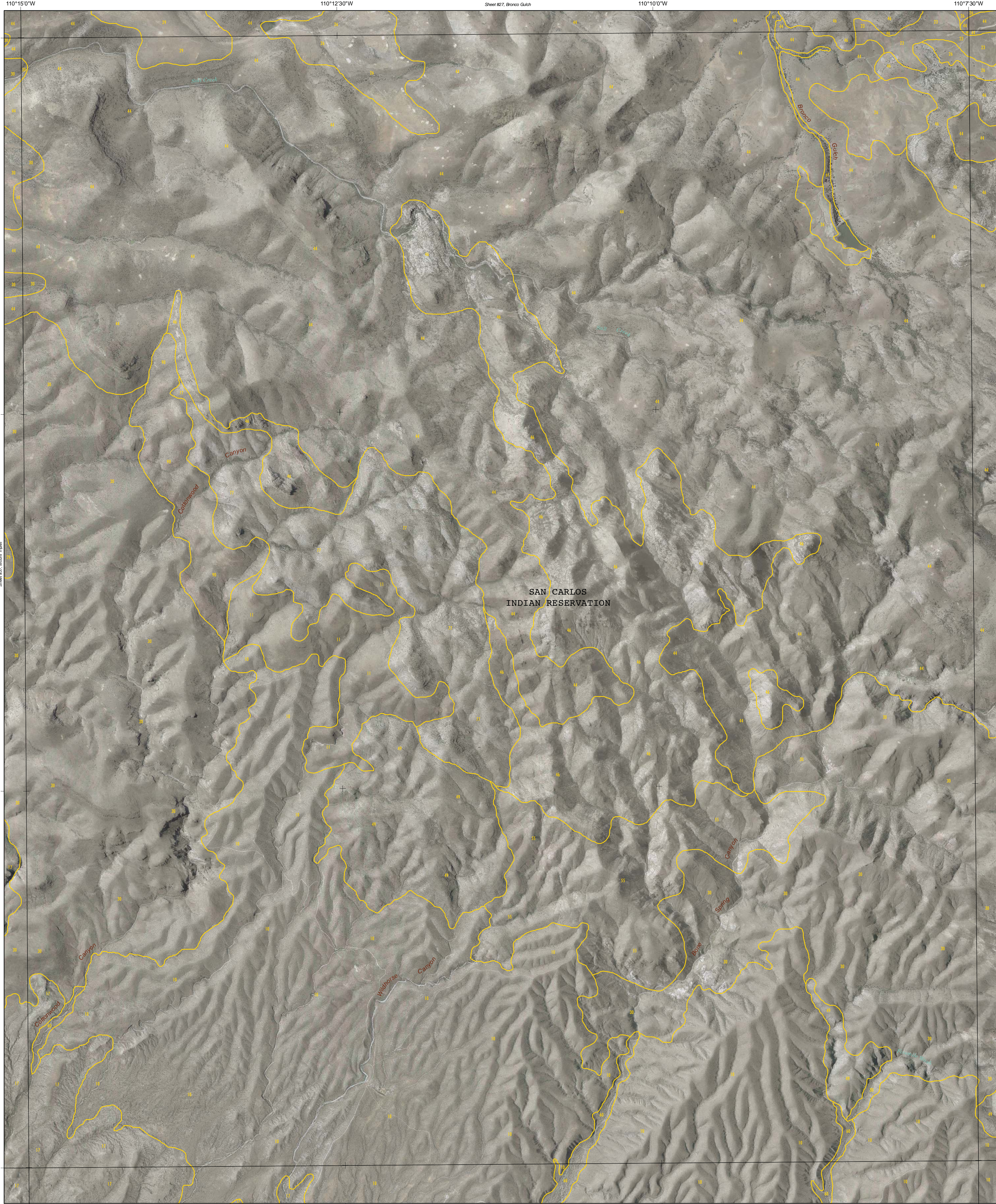
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North American Datum of 1983 (NAD83).



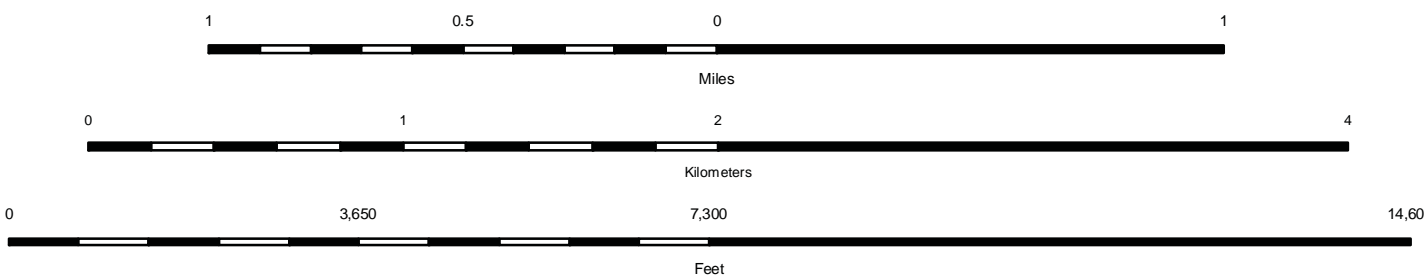
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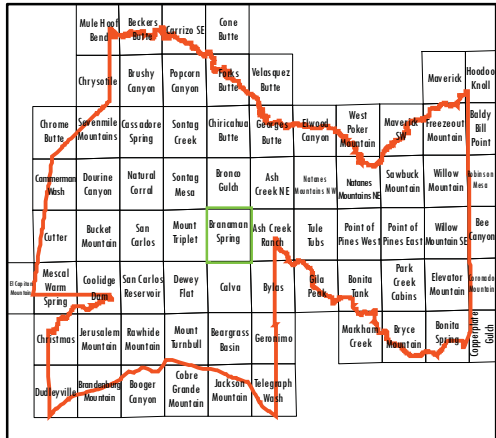


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North American Datum of 1983 (NAD83).



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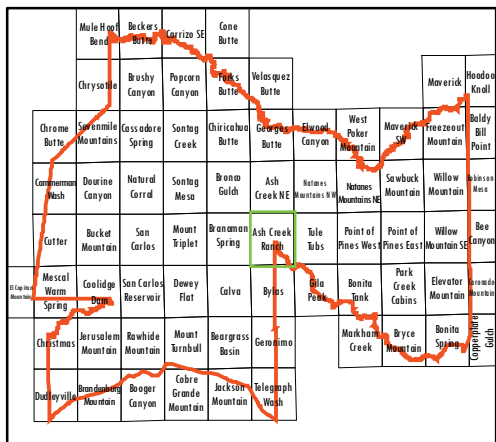
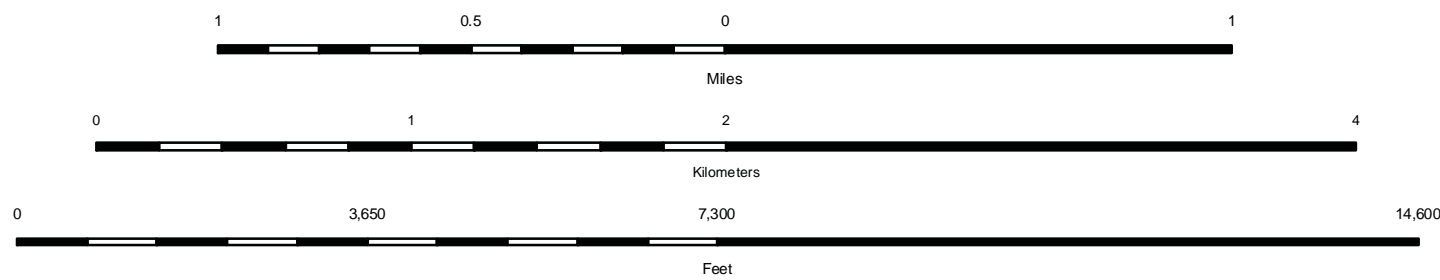


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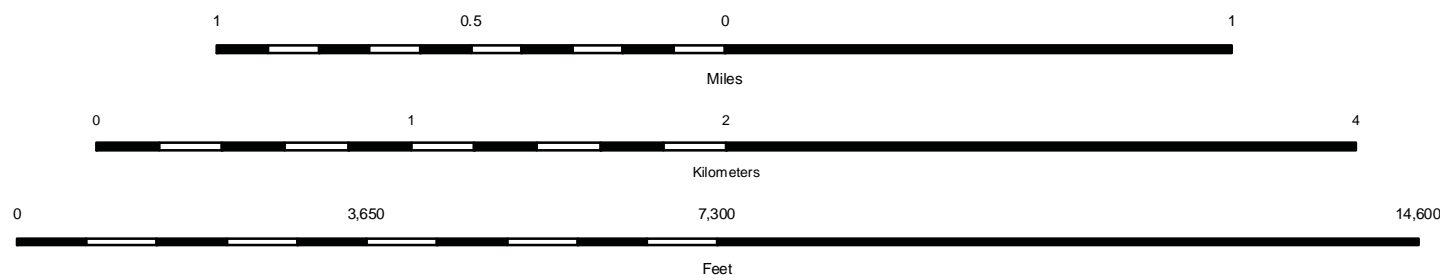
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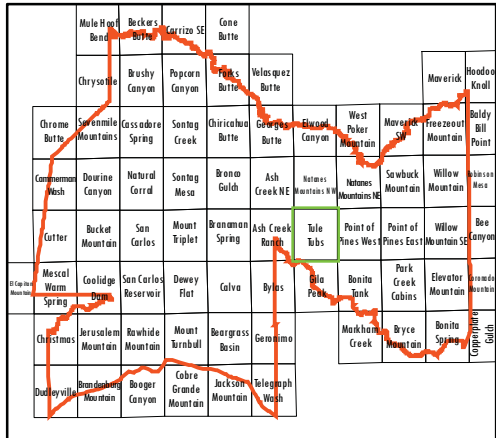


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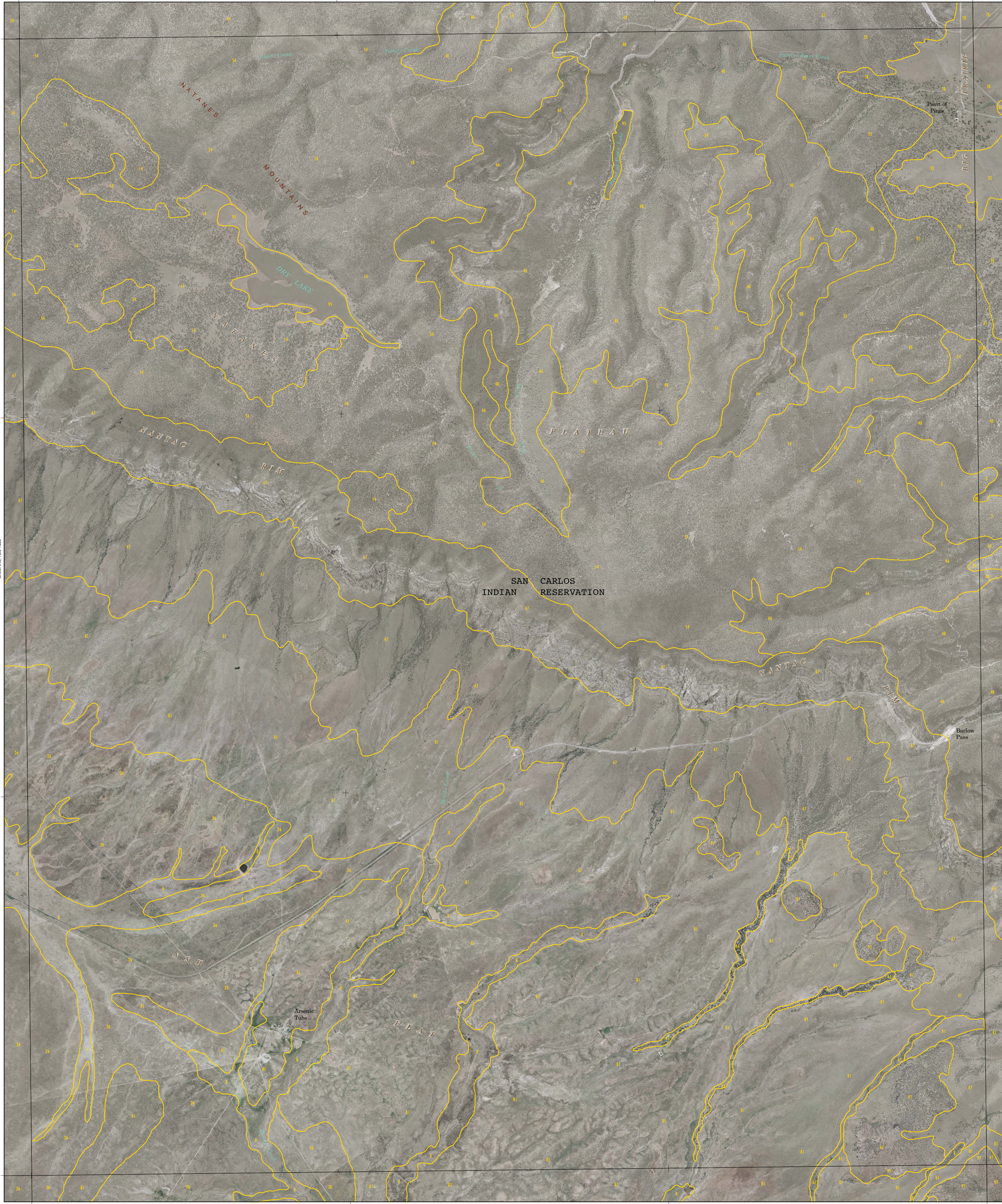
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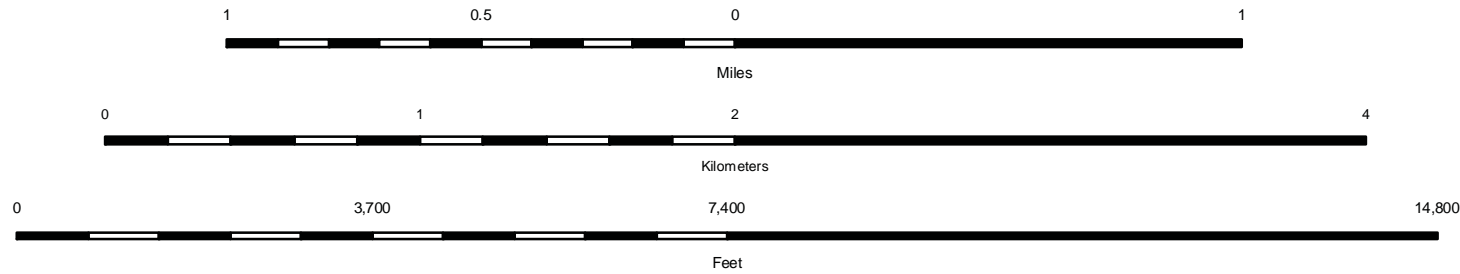


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AND GRAHAM COUNTIES
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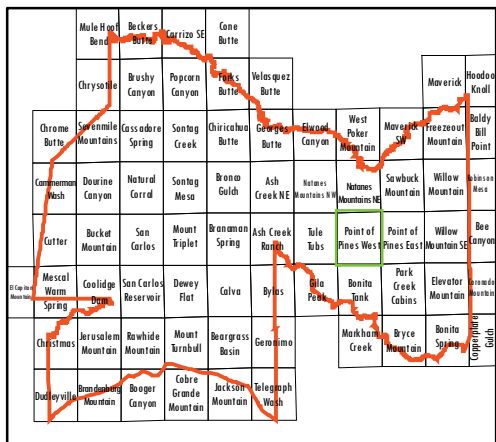


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North American Datum of 1983 (NAD83).



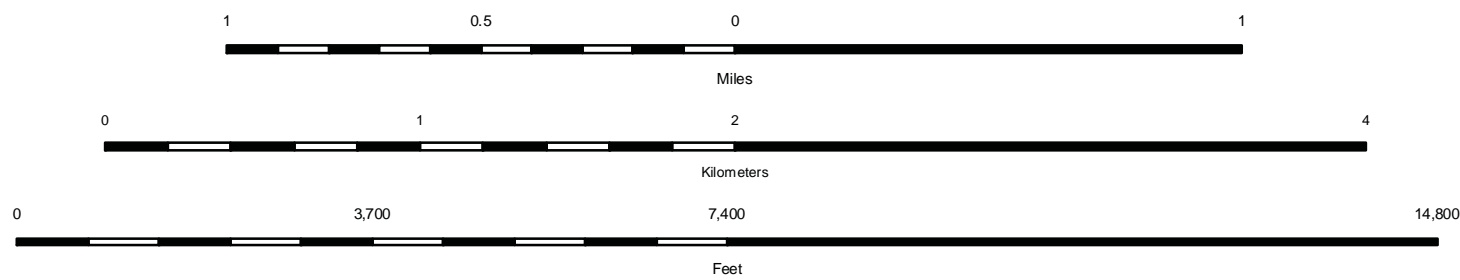
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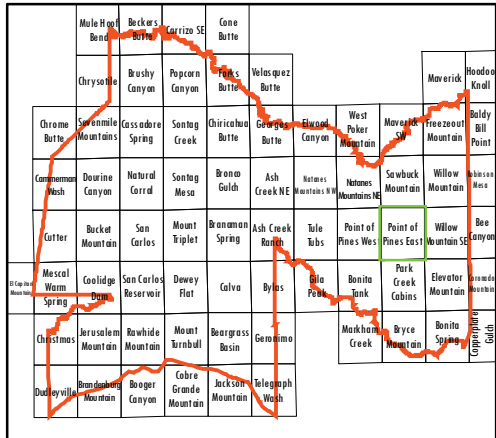


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North American Datum of 1983 (NAD83).



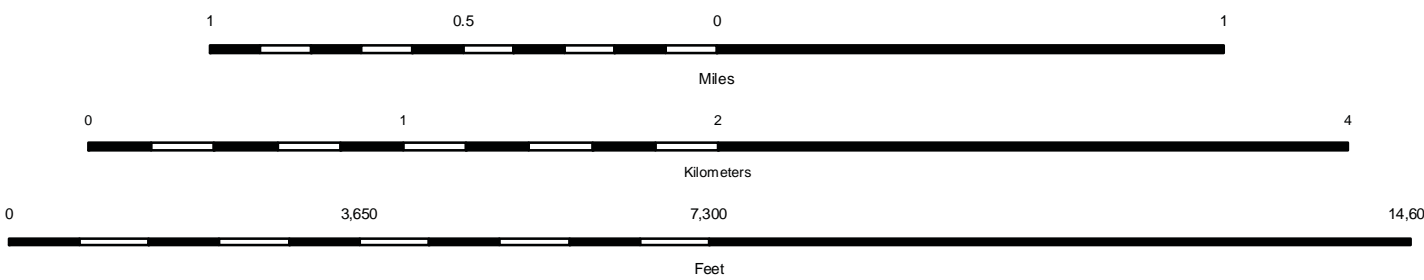
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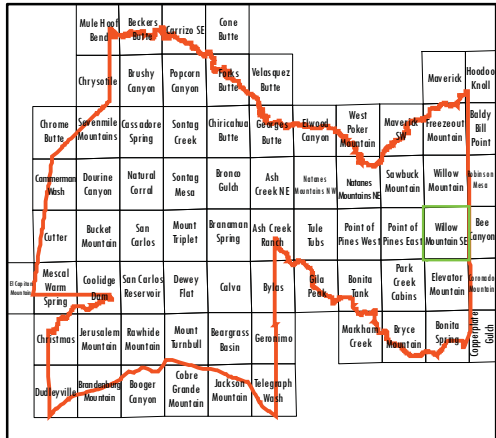


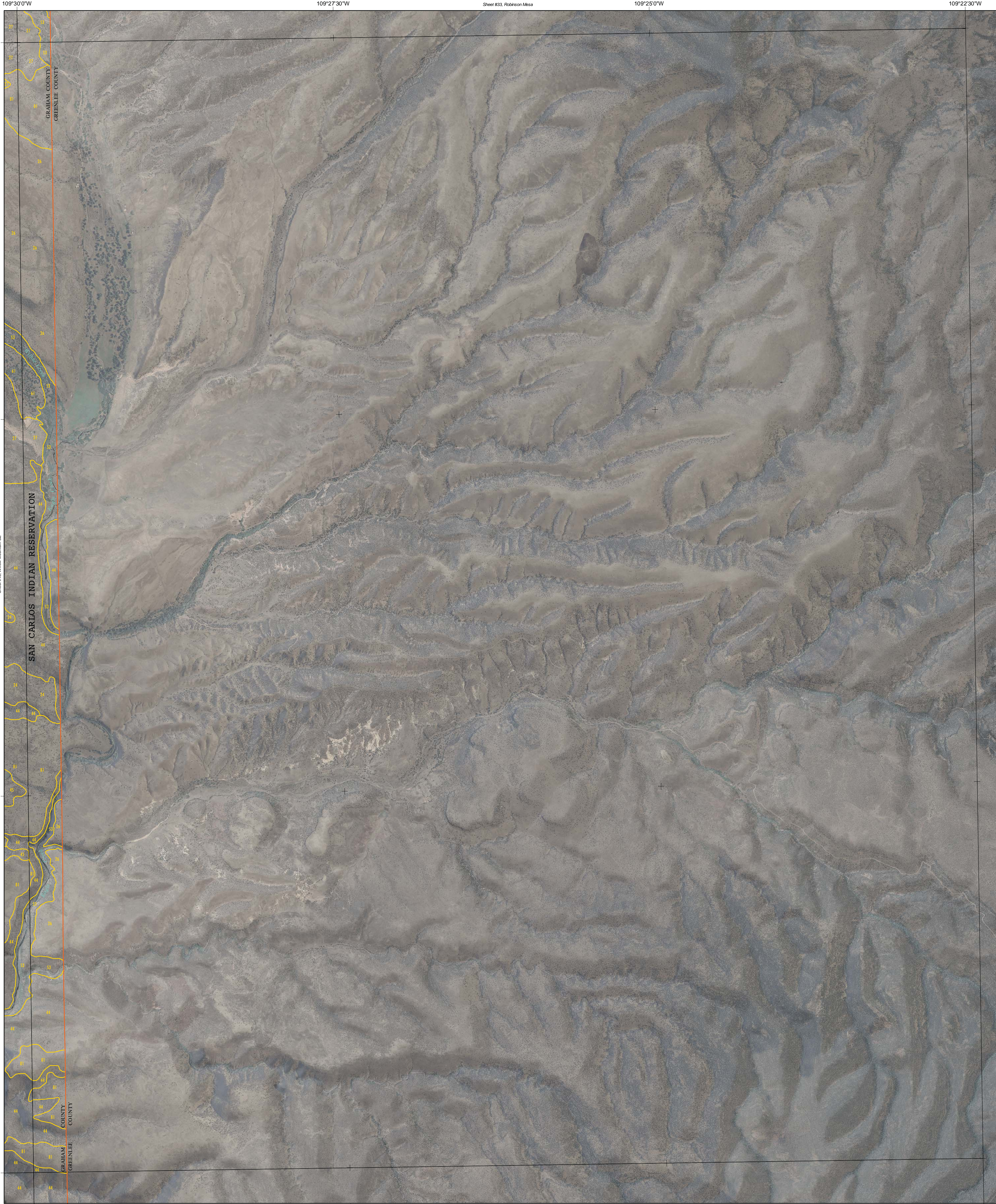
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North American Datum of 1983 (NAD83).



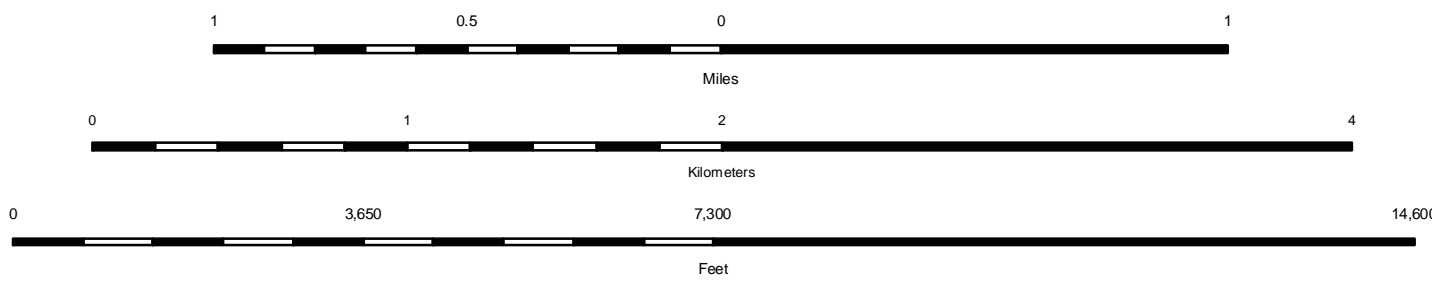
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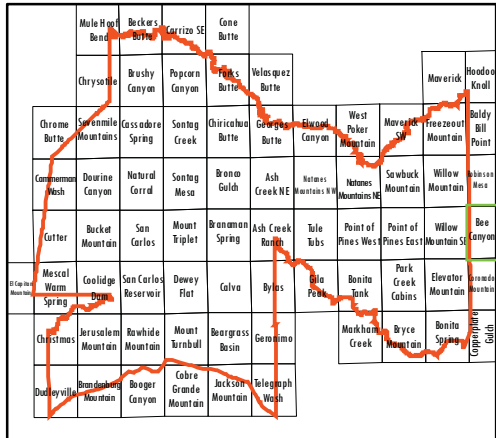


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North American Datum of 1983 (NAD83).



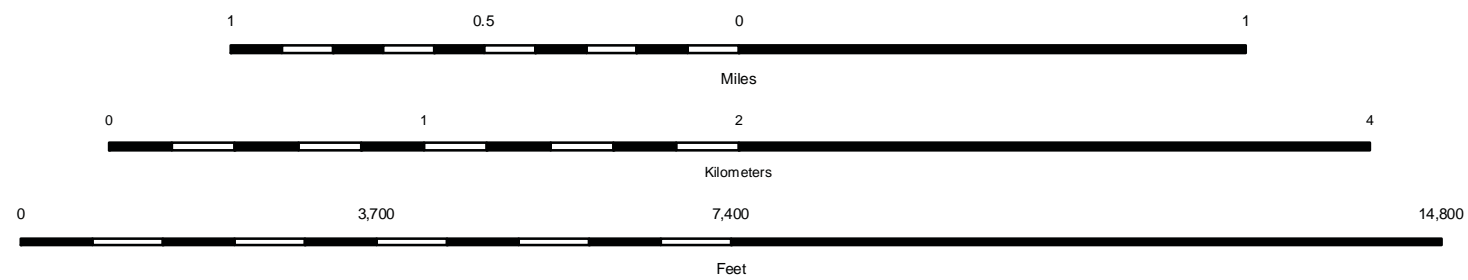
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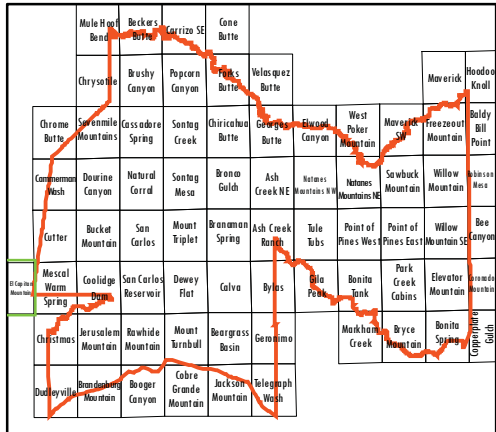


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North American Datum of 1983 (NAD83).



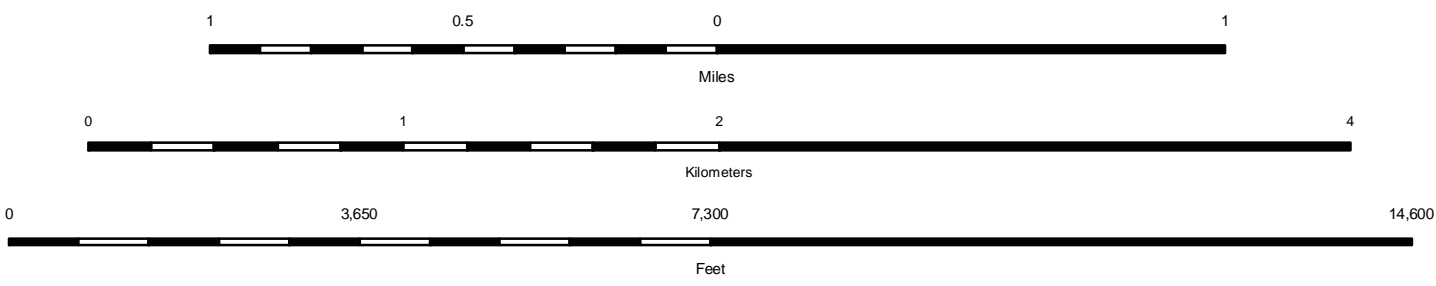
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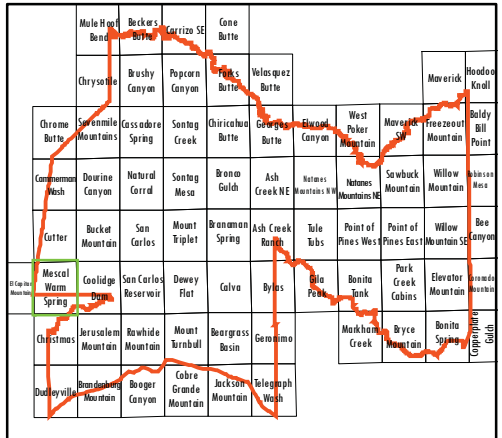


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North American Datum of 1983 (NAD83).



SCALE 1:24000



Sheet #46, Coconino

Sheet #48, San Carlos

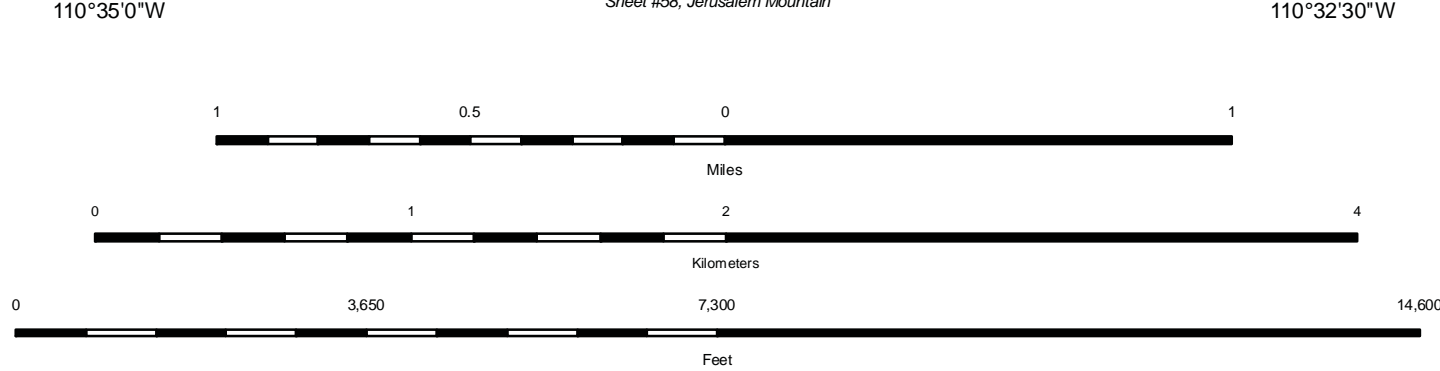


Sheet #47, Chino

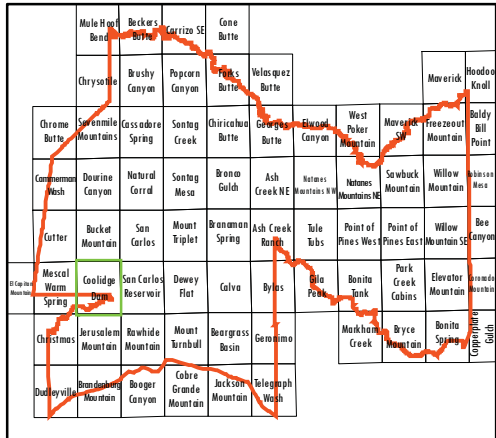
Sheet #49, Pinal

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North American Datum of 1983 (NAD83).



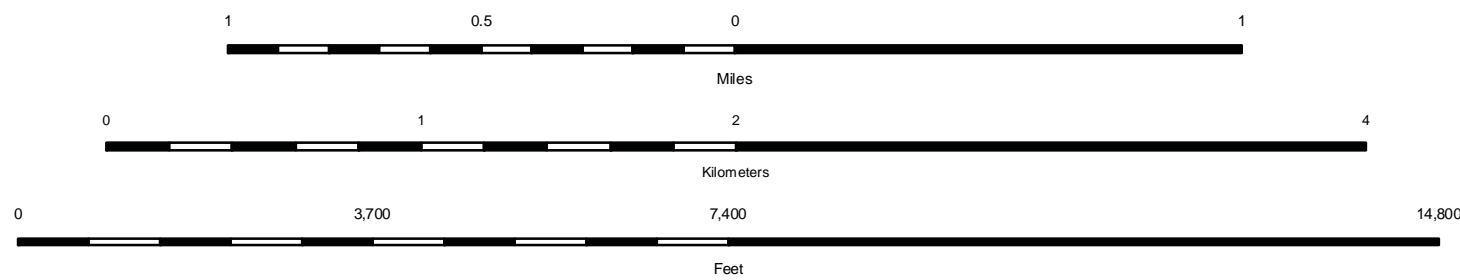
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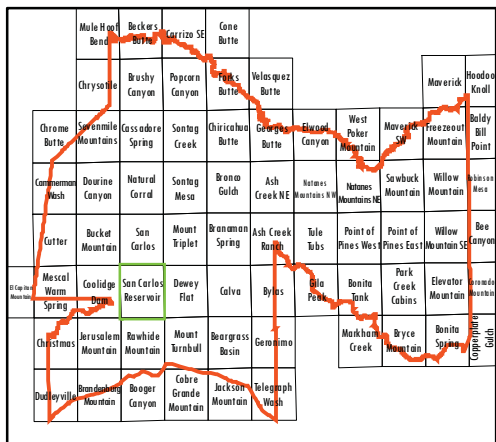


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North American Datum of 1983 (NAD83).



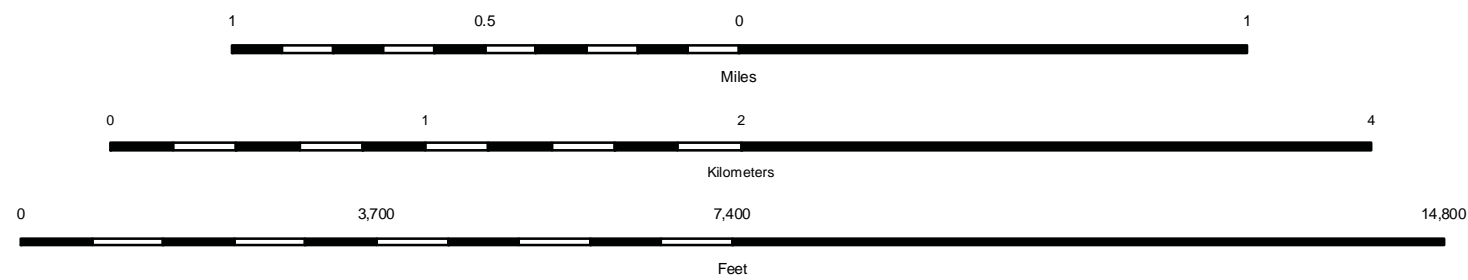
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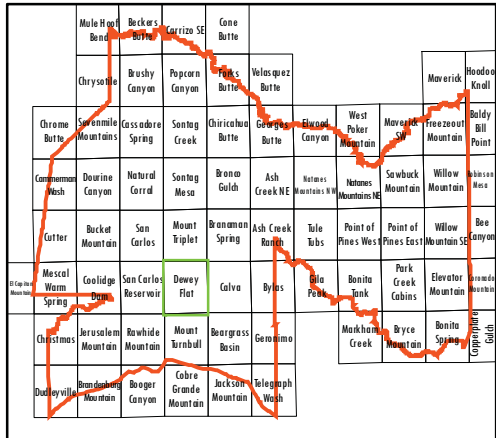


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North American Datum of 1983 (NAD83).



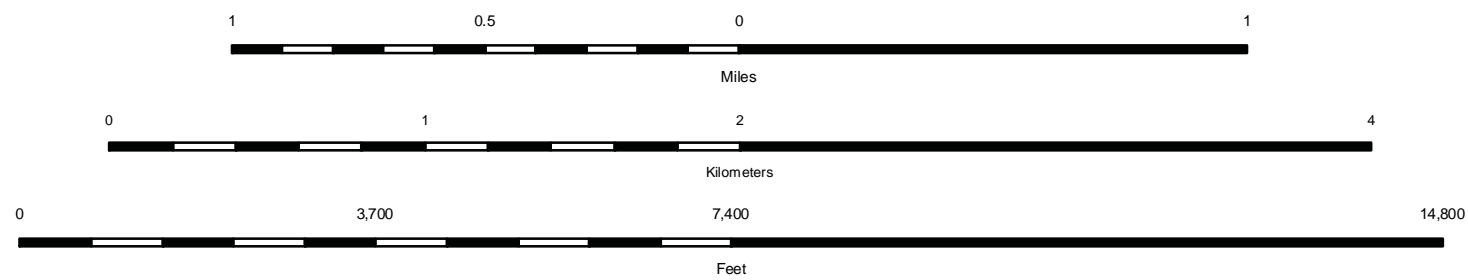
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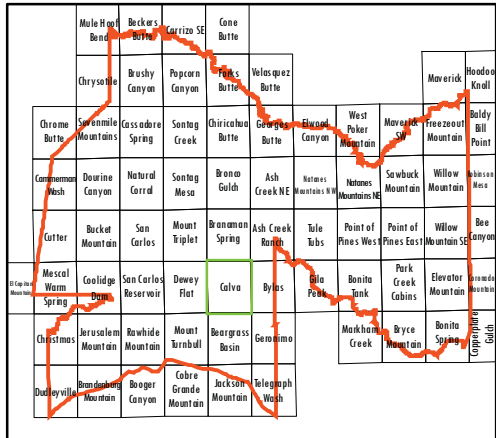


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North American Datum of 1983 (NAD83).



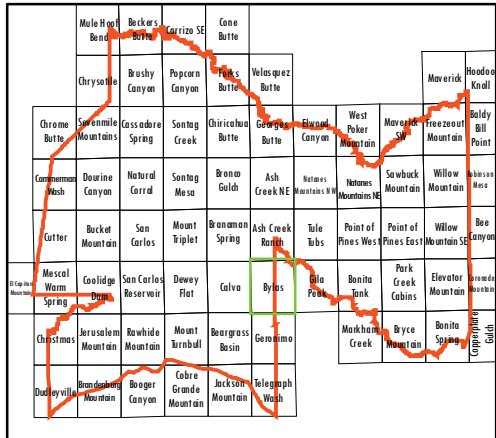
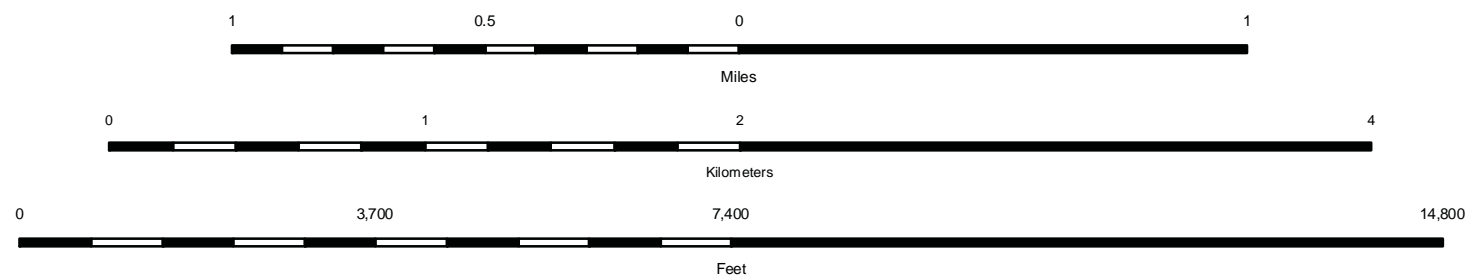
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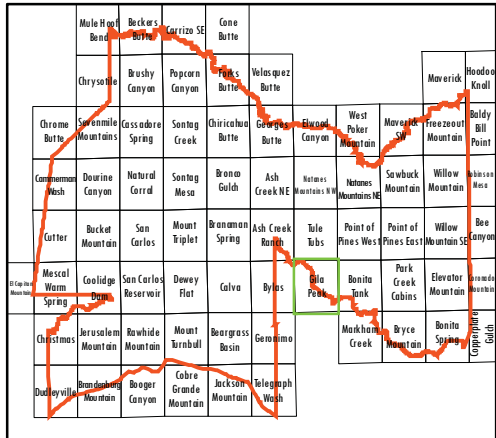
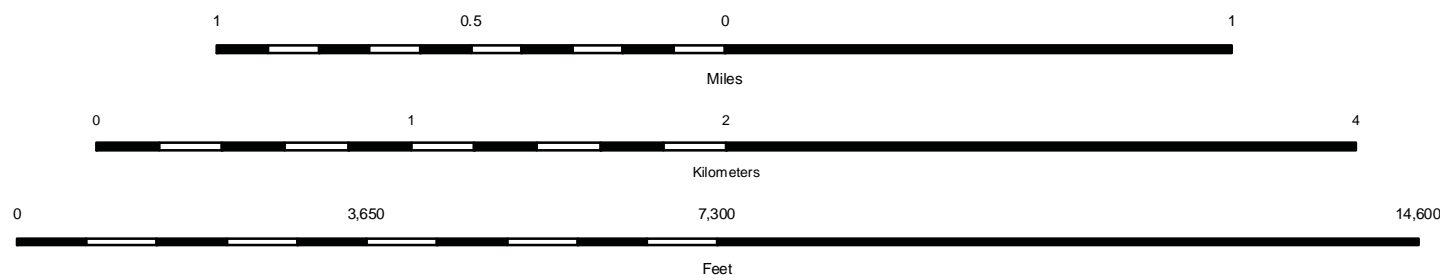
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North American Datum of 1983 (NAD83).



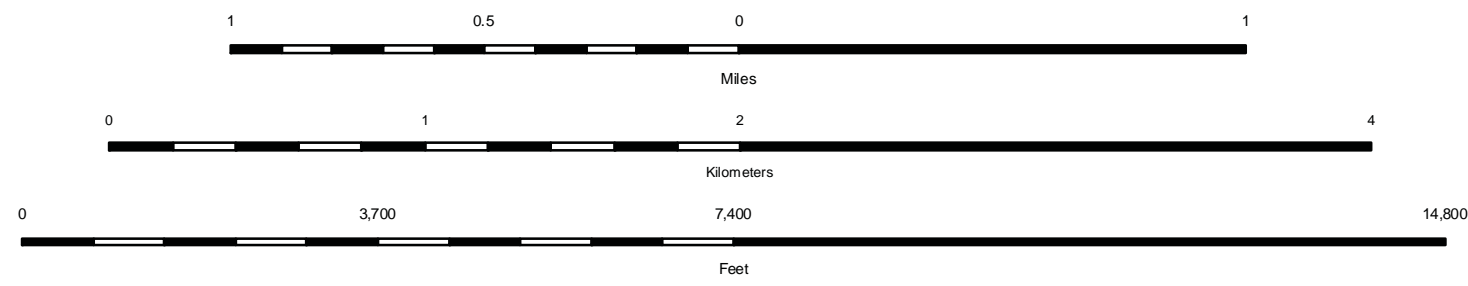
Sheet #40, Pine Flats

Sheet #42, Point of Pines East

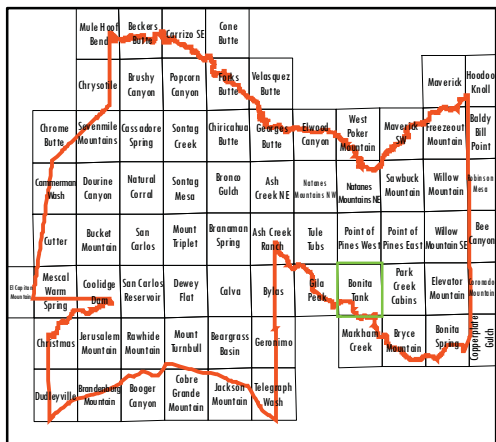


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North American Datum of 1983 (NAD83).



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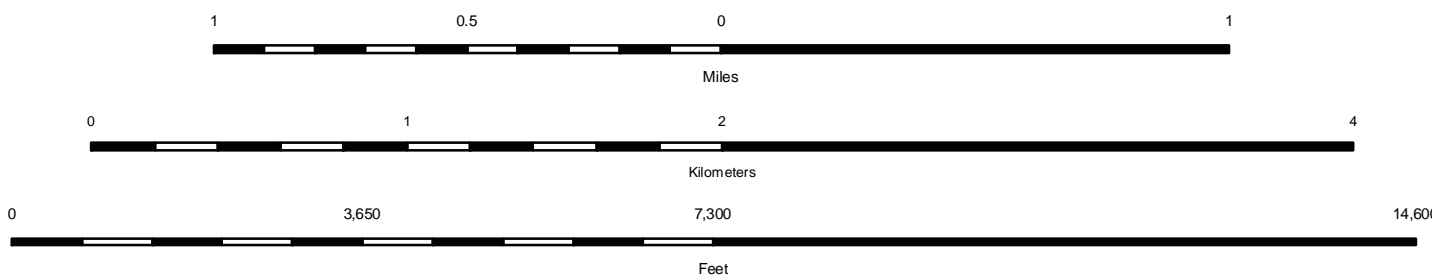


Sheet #44, Gypsum Mountain

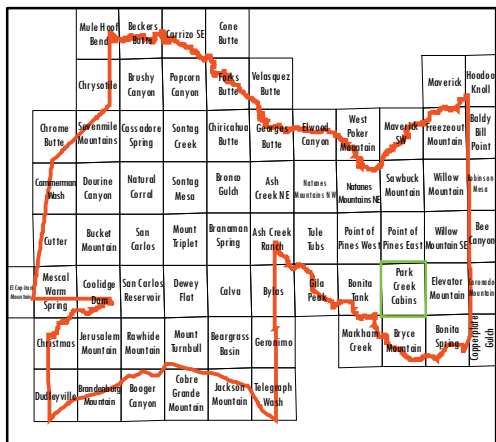


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North American Datum of 1983 (NAD83).



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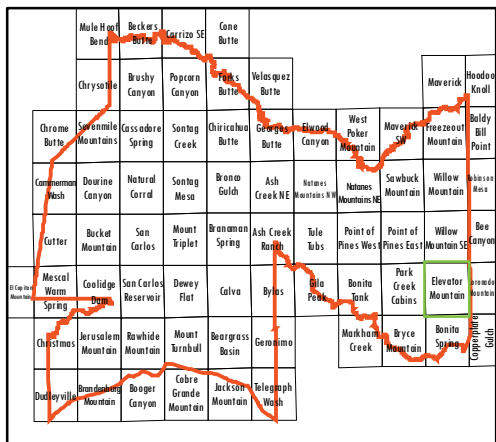
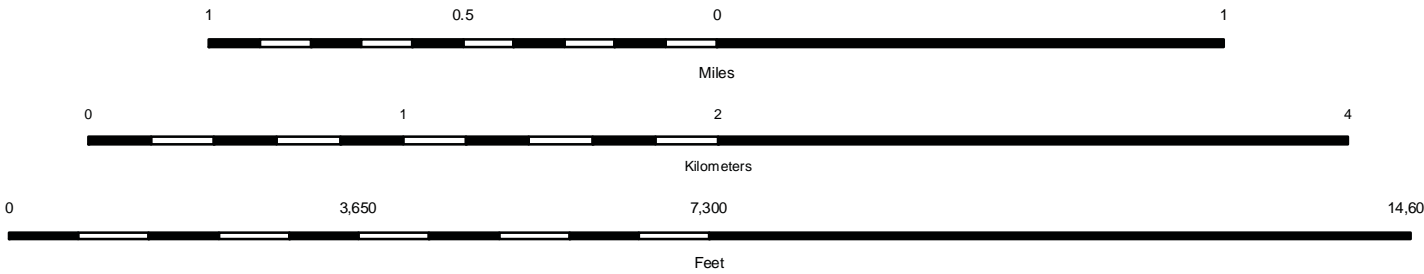


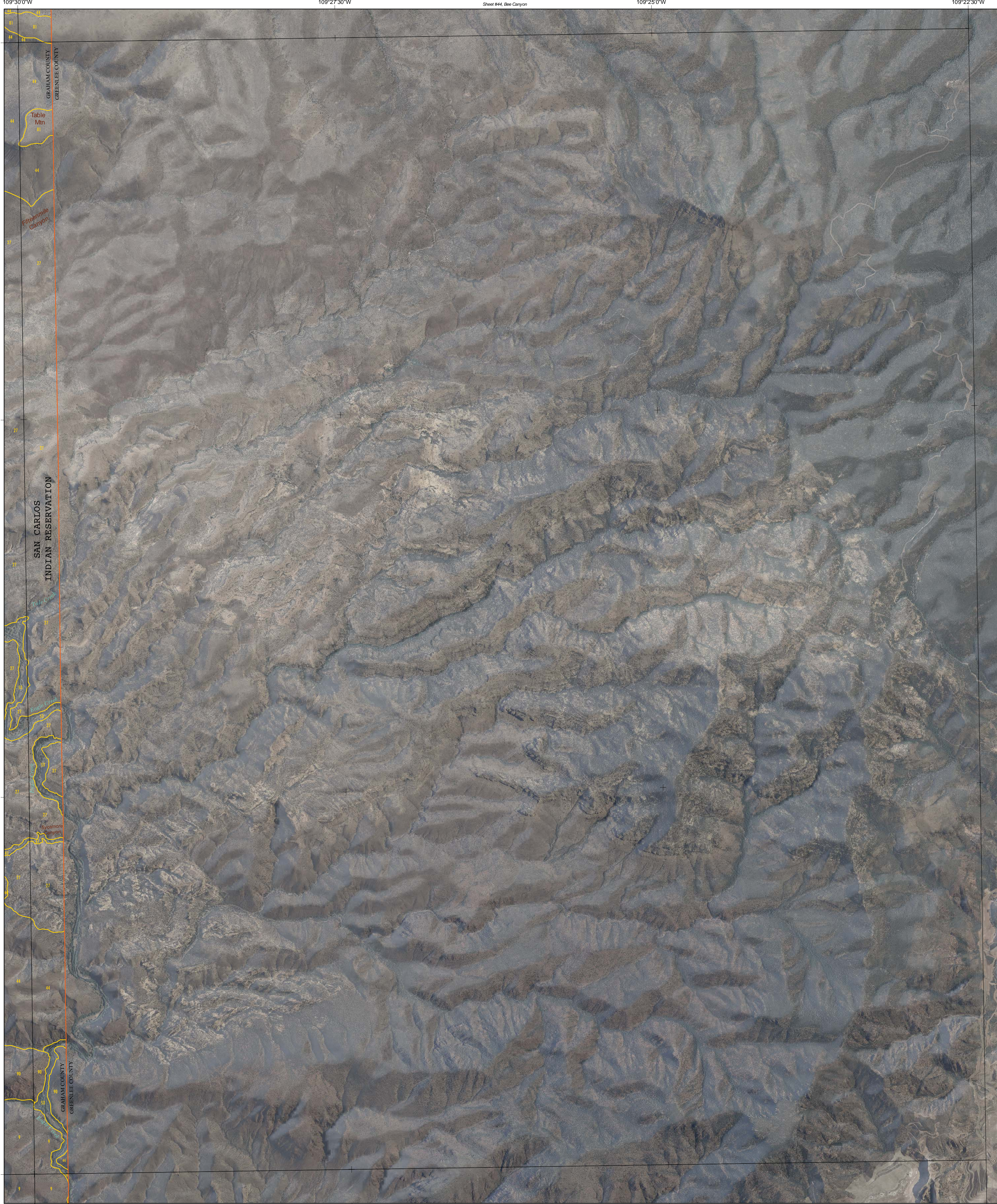
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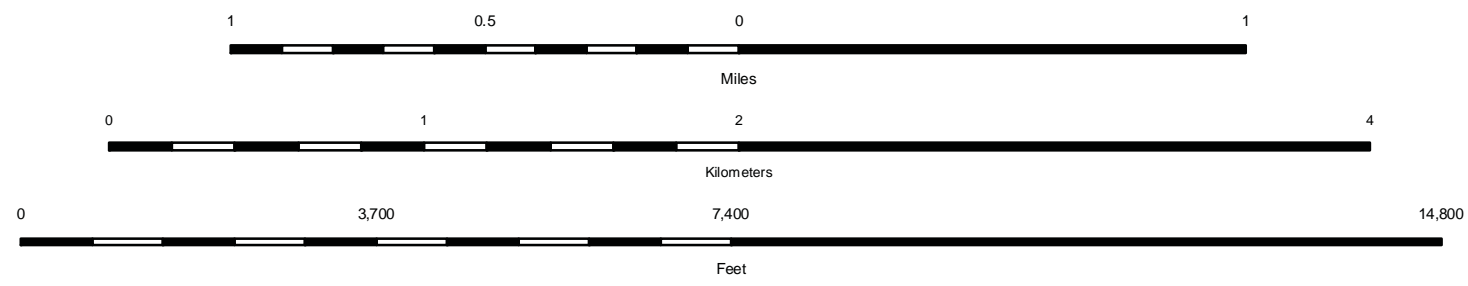
North American Datum of 1983 (NAD83).



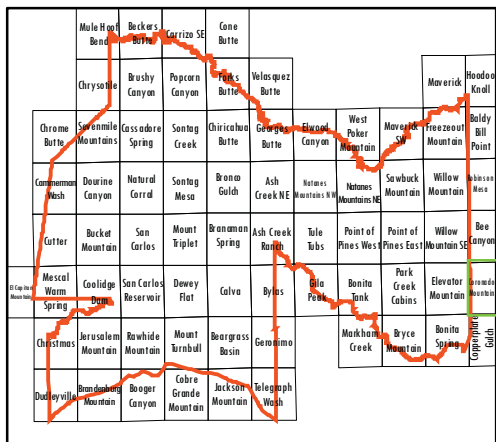


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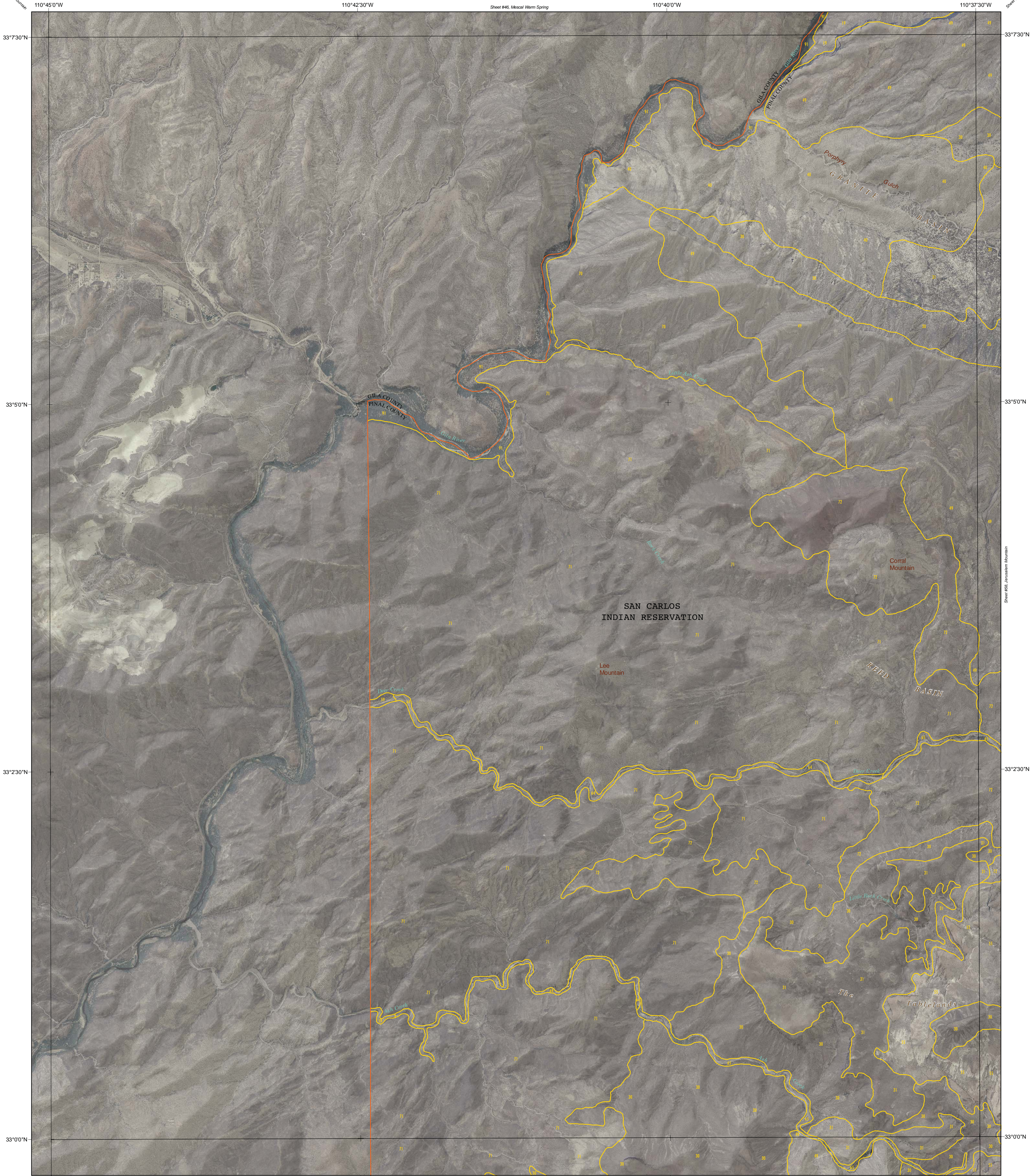
North American Datum of 1983 (NAD83).



SCALE 1:24000

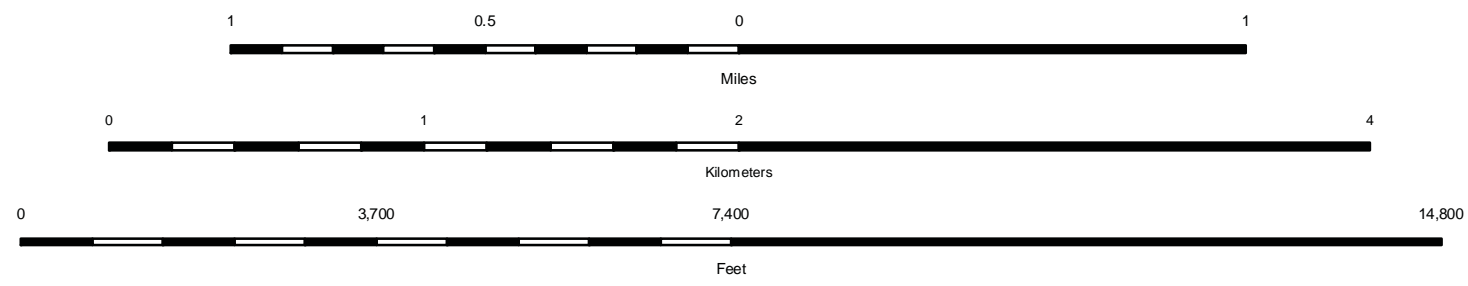


SAN CARLOS INDIAN
RESERVATION, ARIZONA,
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AND GRAHAM COUNTIES
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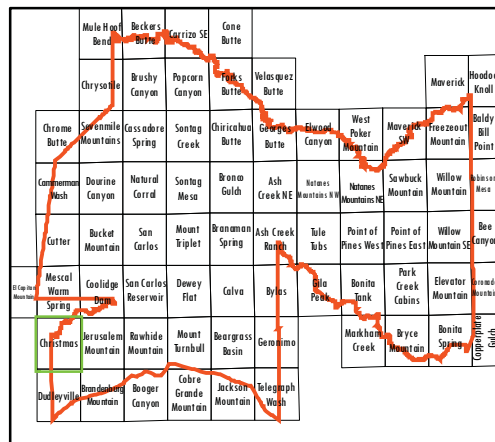


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North American Datum of 1983 (NAD83).



SCALE 1:24000

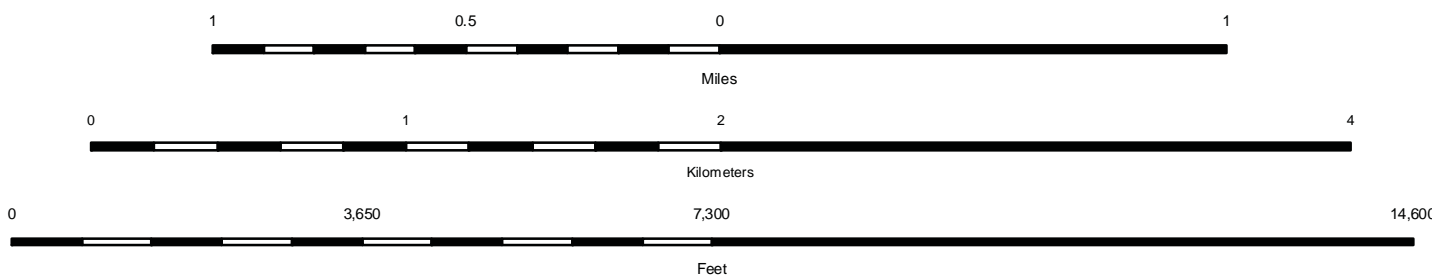


SAN CARLOS INDIAN
RESERVATION, ARIZONA,
PARTS OF GILA
AND GRAHAM COUNTIES
SHEET 57 OF 72

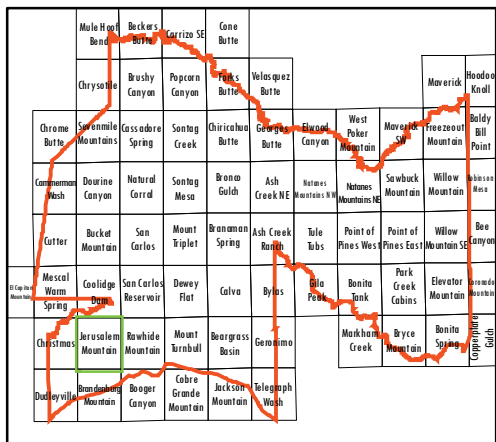


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North American Datum of 1983 (NAD83).



SCALE 1:24000

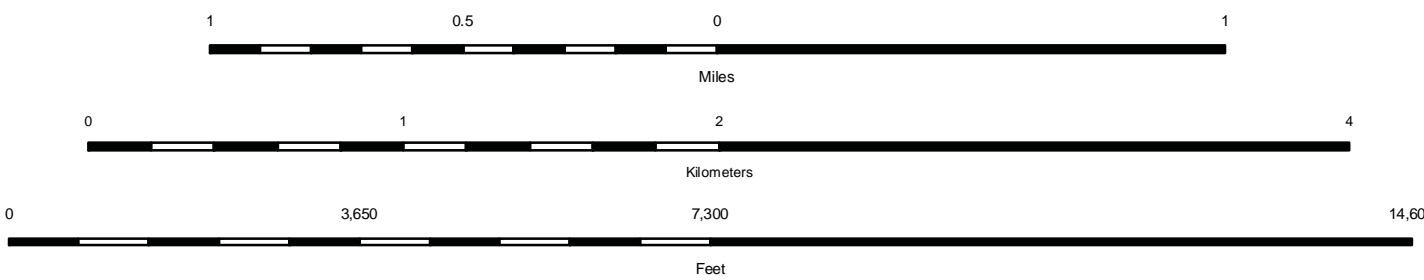


SAN CARLOS INDIAN
RESERVATION, ARIZONA,
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AND GRAHAM COUNTIES
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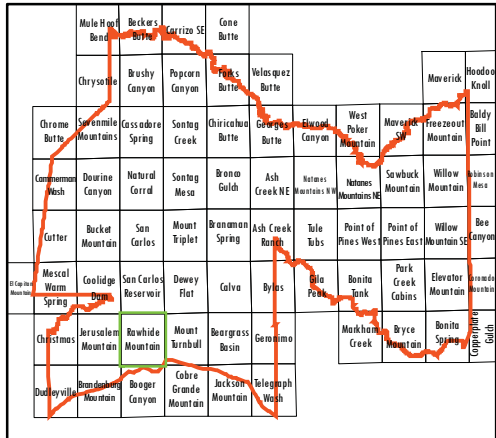


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North American Datum of 1983 (NAD83).



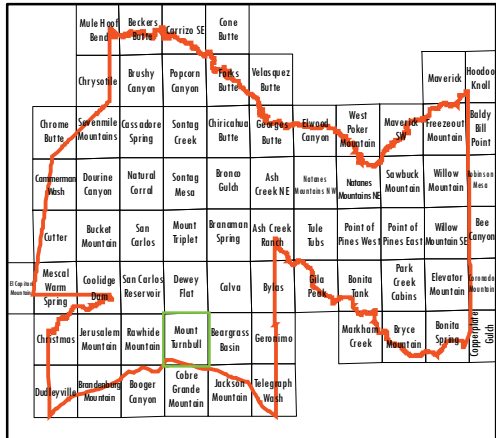
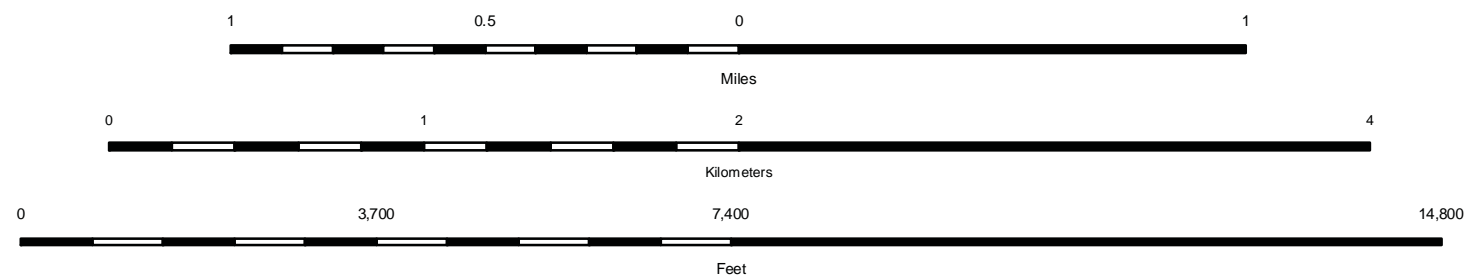
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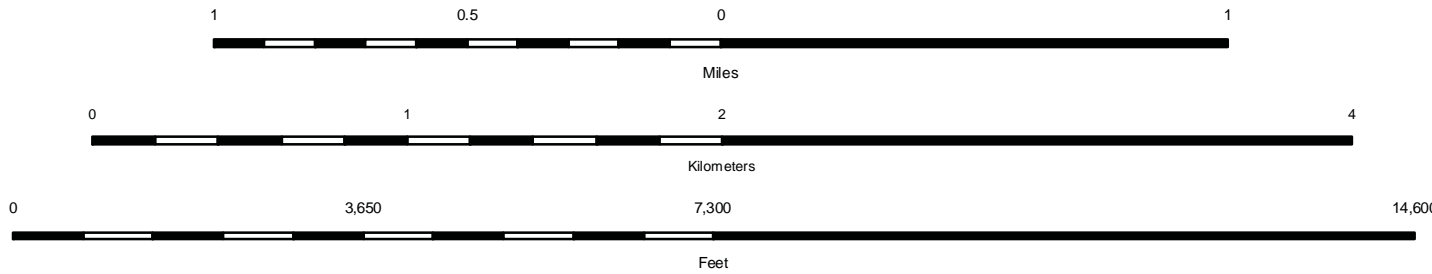
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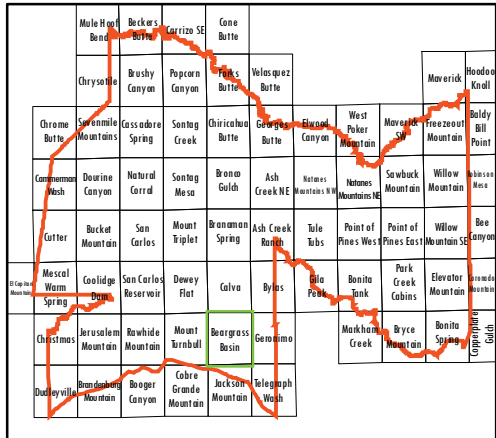


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North American Datum of 1983 (NAD83).



SCALE 1:24000

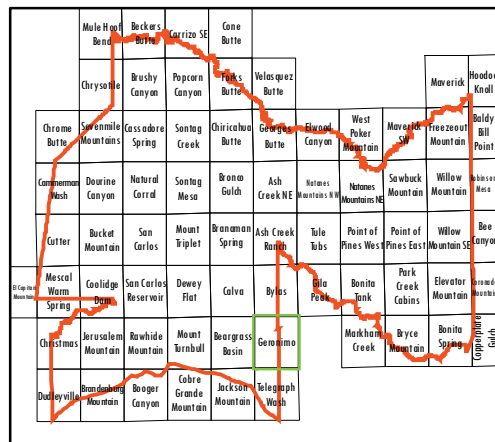
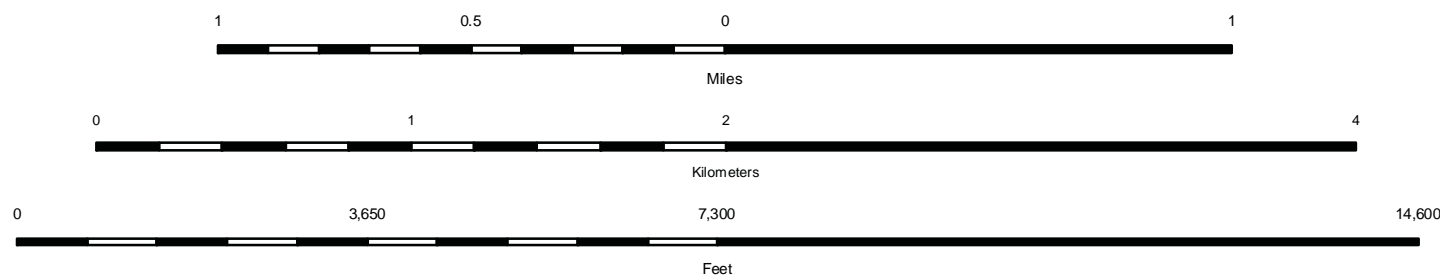


SAN CARLOS INDIAN
RESERVATION, ARIZONA,
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AND GRAHAM COUNTIES
SHEET 61 OF 72



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North American Datum of 1983 (NAD83).



SAN CARLOS INDIAN
RESERVATION, ARIZONA,
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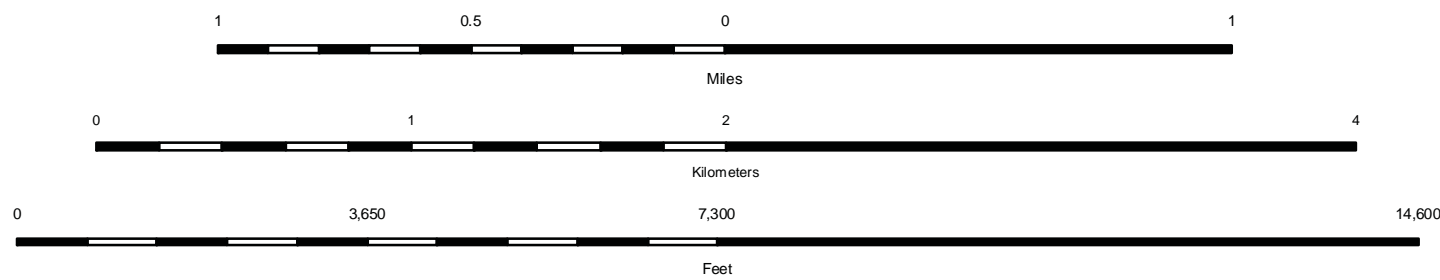
Sheet #62, Gila River

Sheet #64, Park Creek Canyon

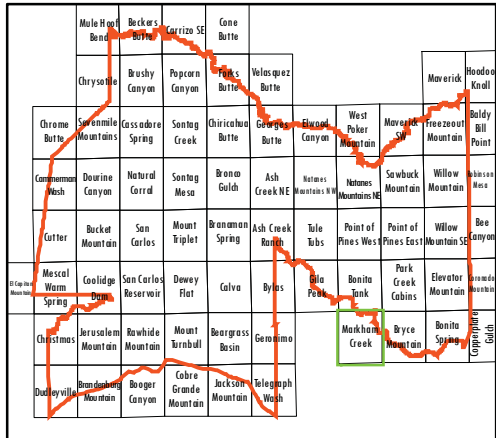


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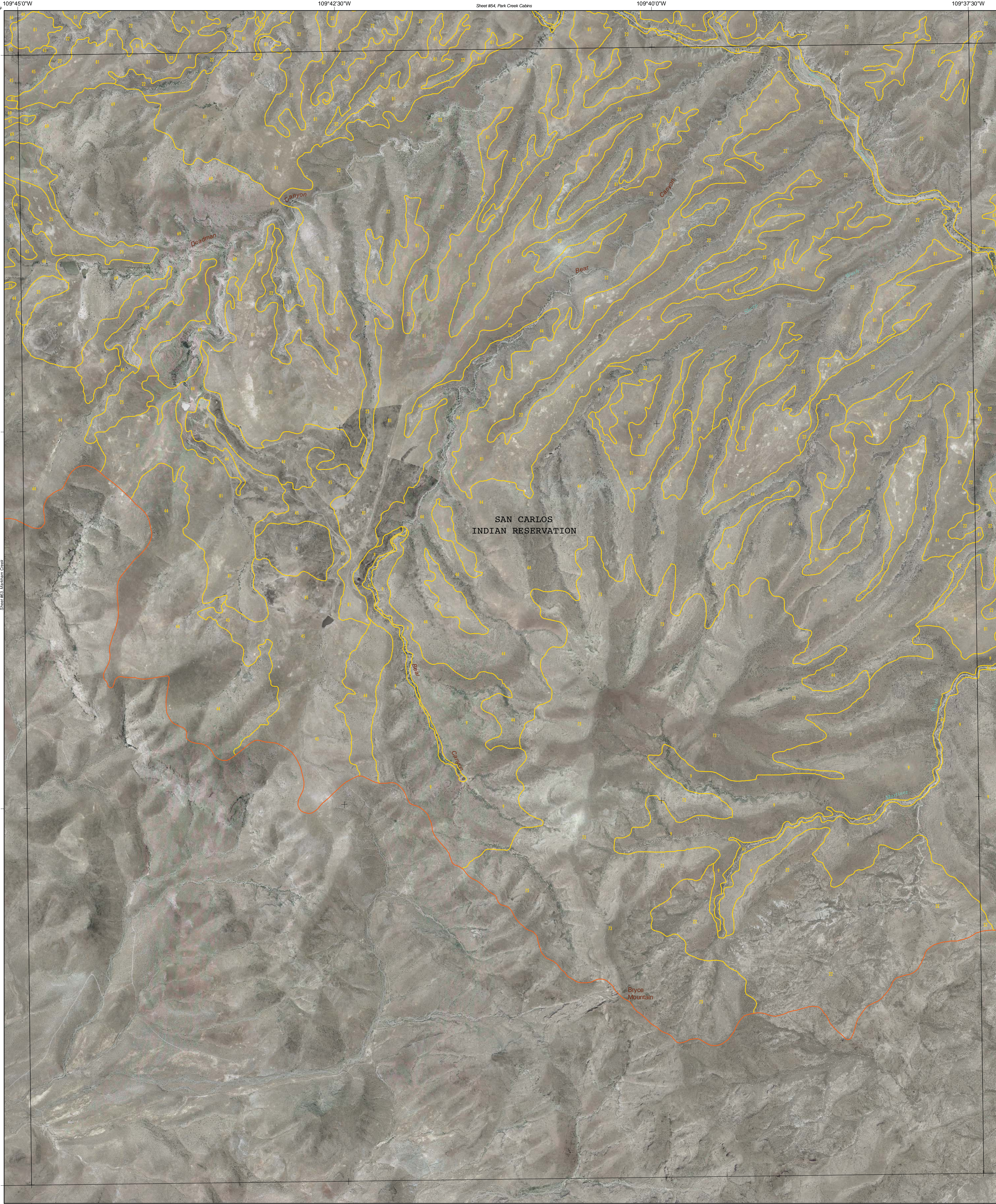
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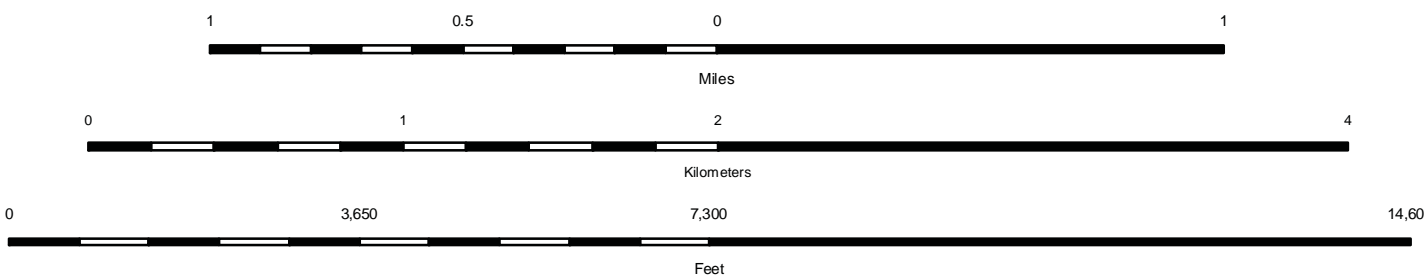


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AND GRAHAM COUNTIES
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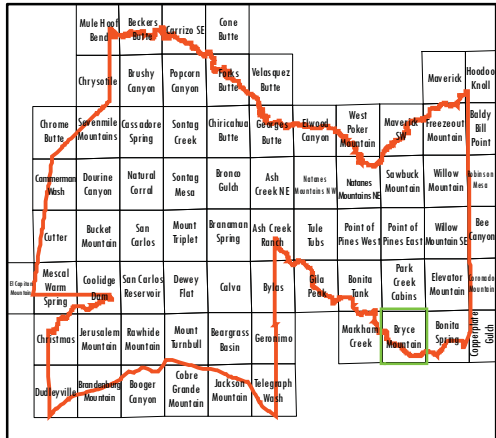


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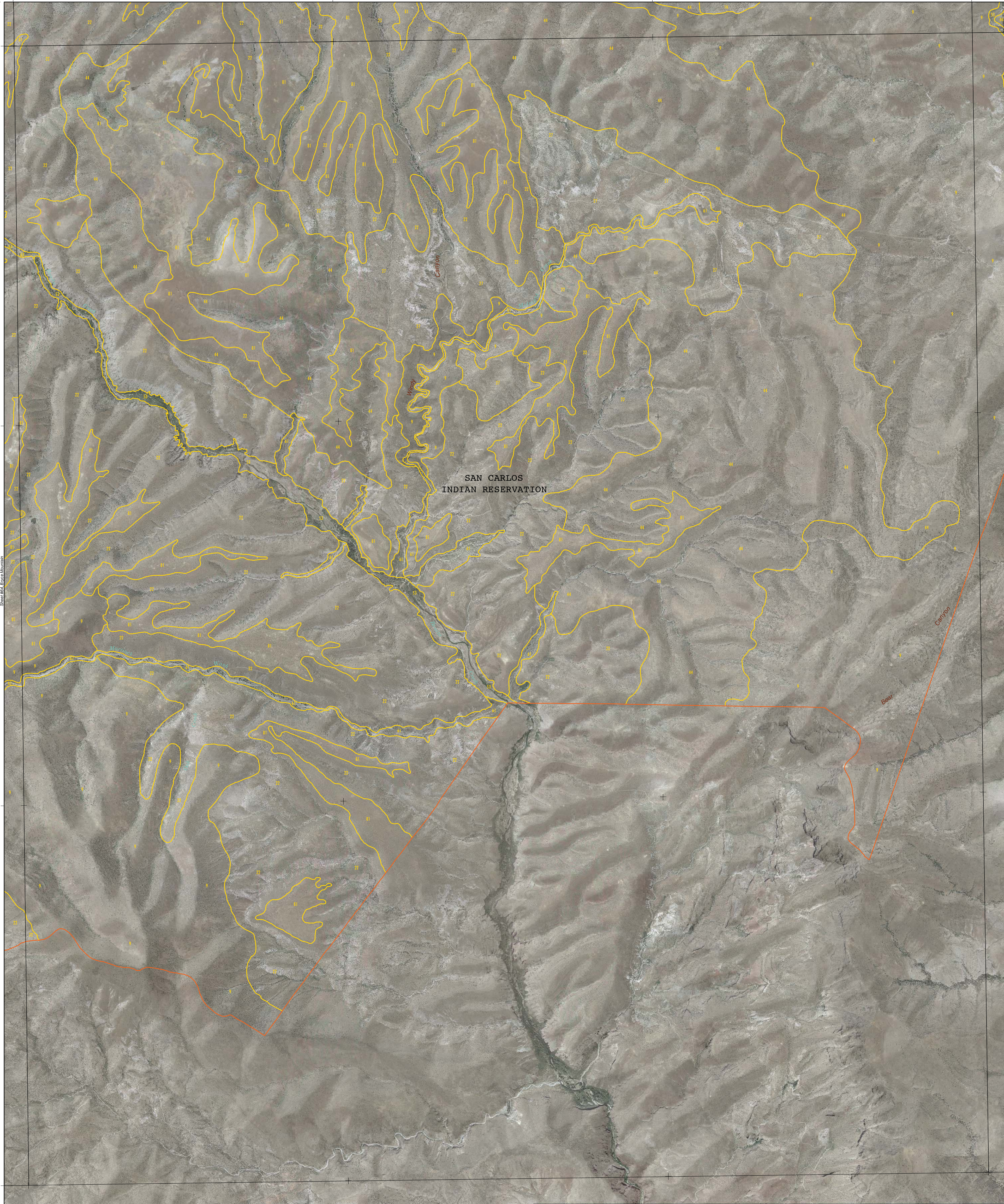
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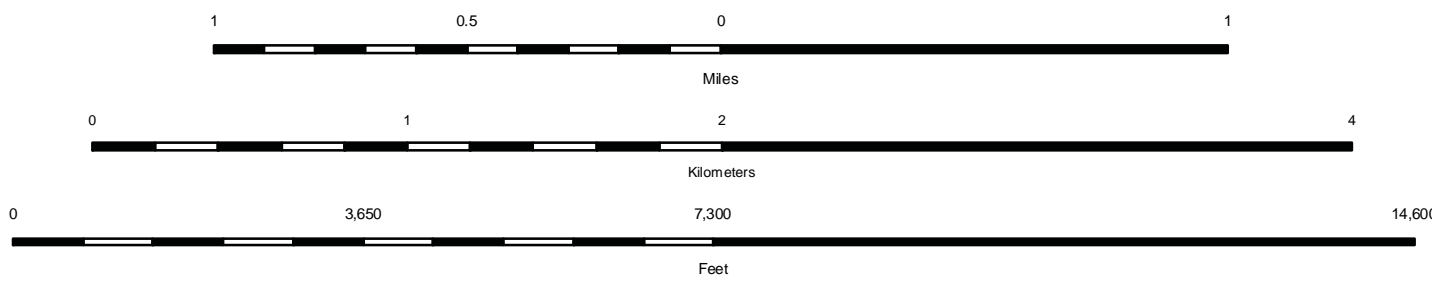


SAN CARLOS INDIAN
RESERVATION, ARIZONA,
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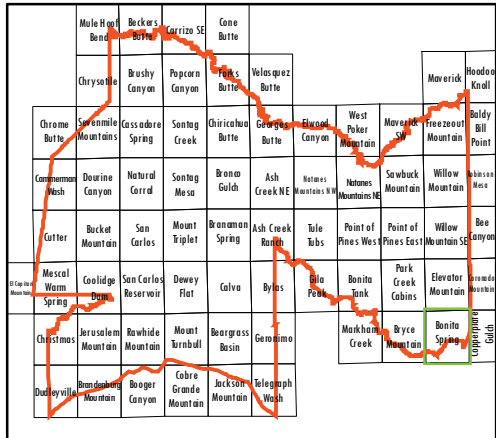


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North American Datum of 1983 (NAD83).



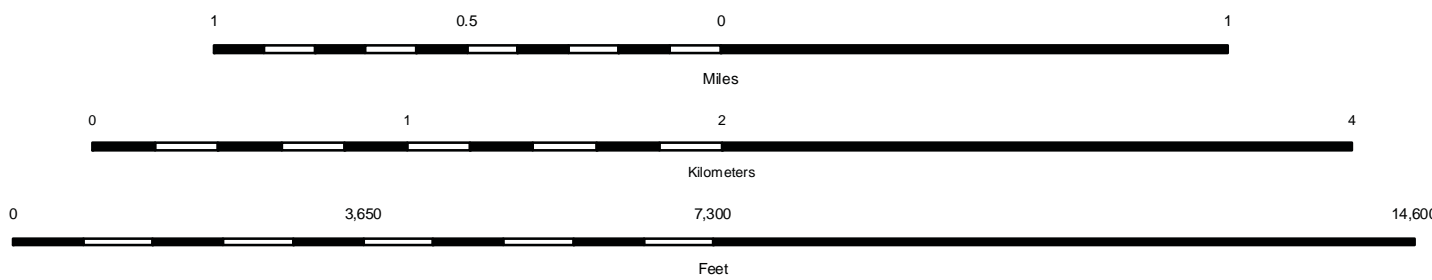
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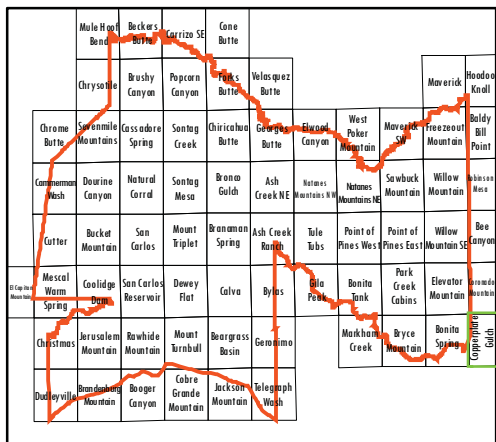


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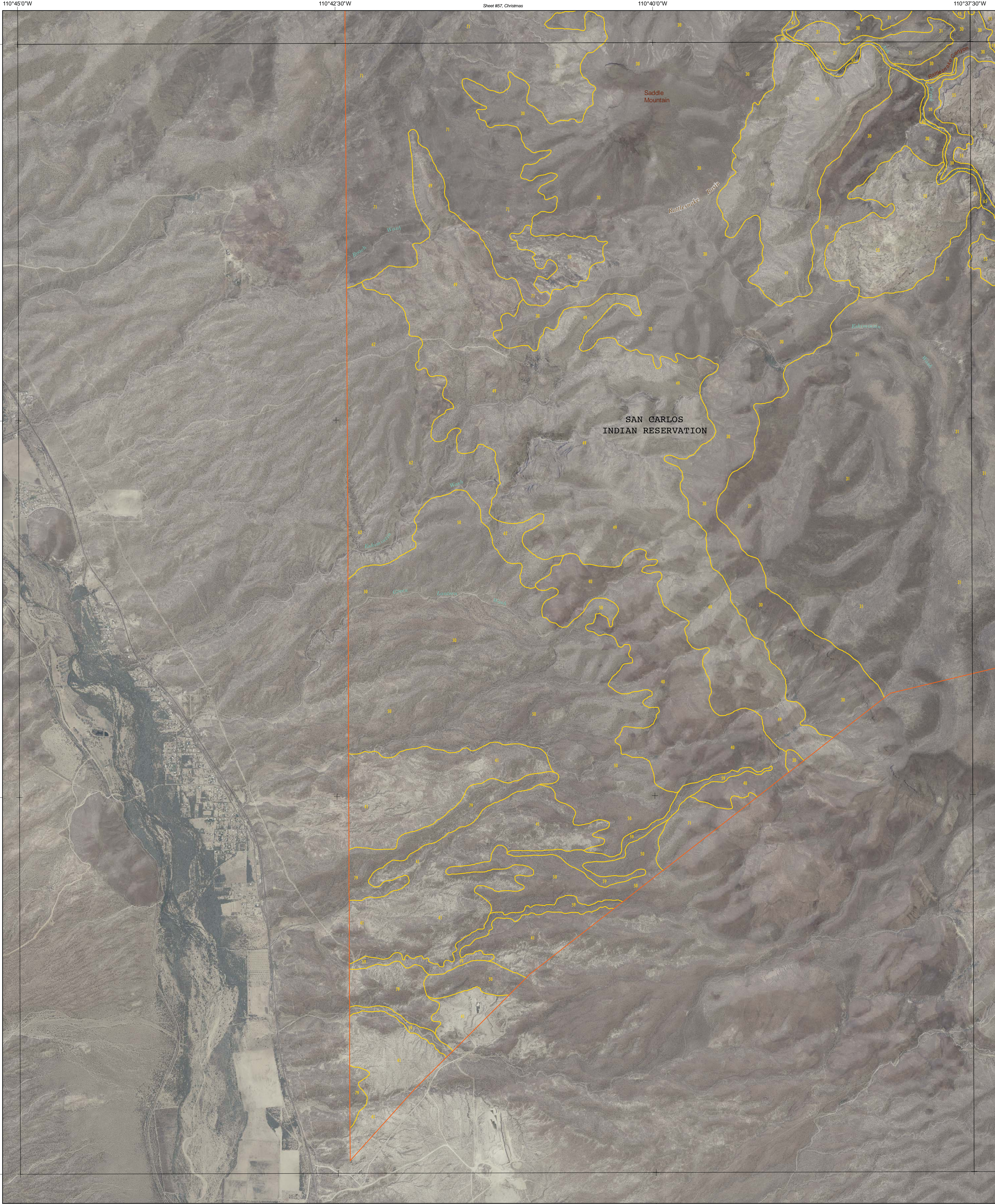
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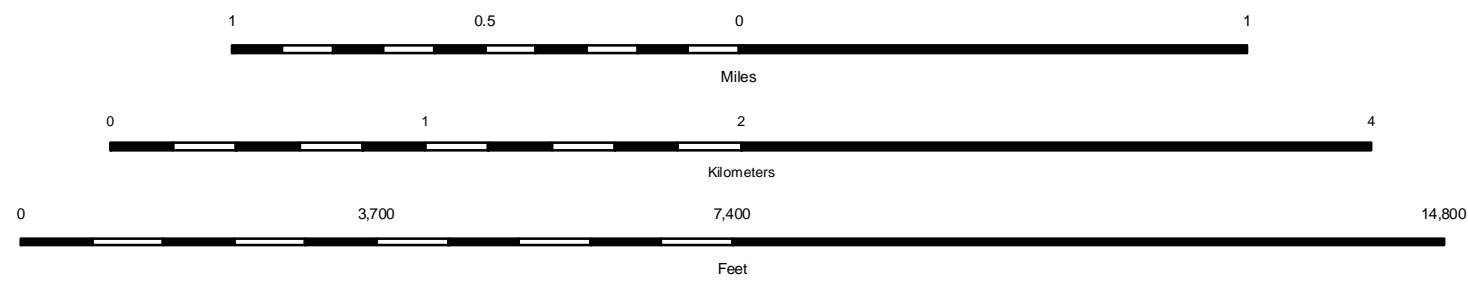


SAN CARLOS INDIAN
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SHEET 66 OF 72

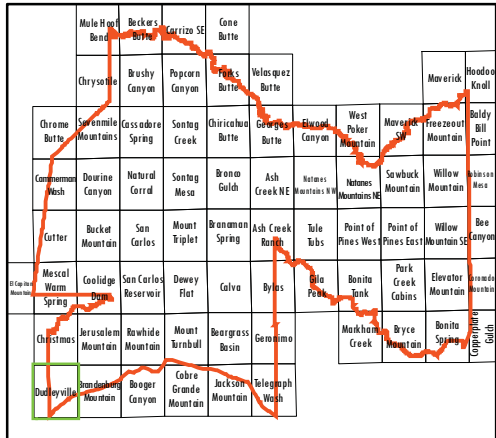


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North American Datum of 1983 (NAD83).



SCALE 1:24000

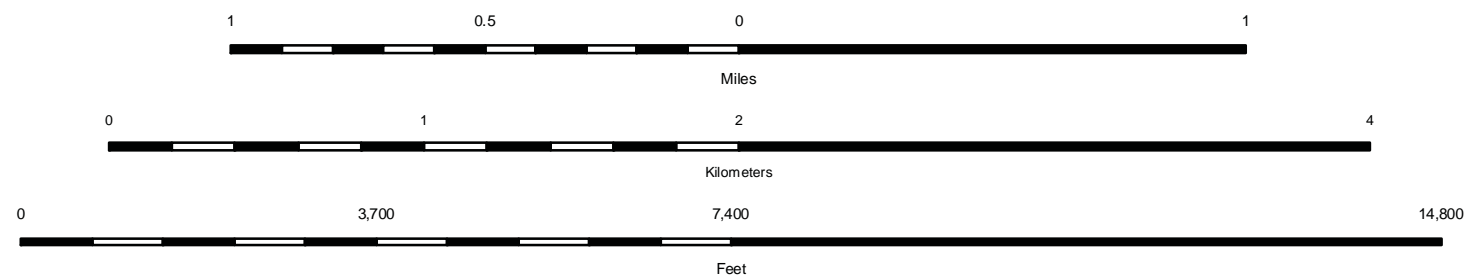


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RESERVATION, ARIZONA,
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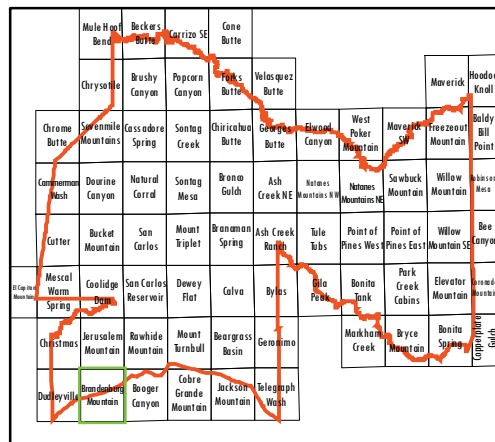


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North American Datum of 1983 (NAD83).



SCALE 1:24000

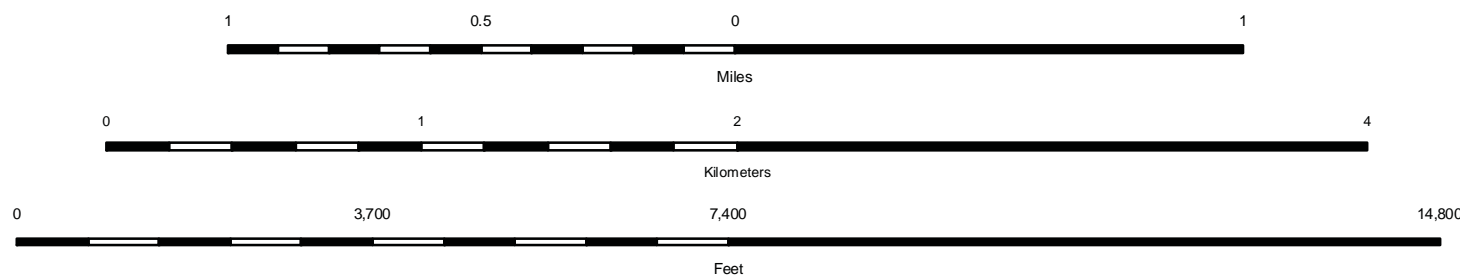


SAN CARLOS INDIAN
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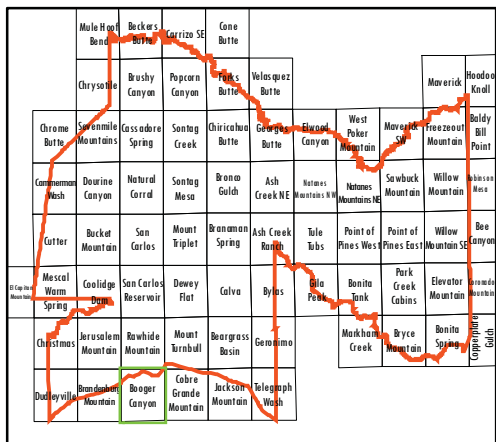


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North American Datum of 1983 (NAD83).



SCALE 1:24000



Sheet #69, Rainbow Mountain

UNITED STATES
DEPARTMENT OF AGRICULTURE
NATURAL RESOURCES CONSERVATION SERVICE

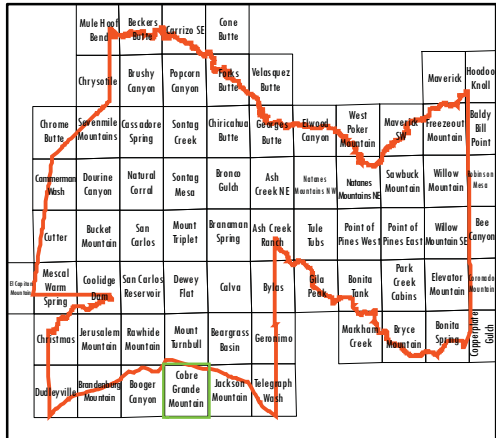
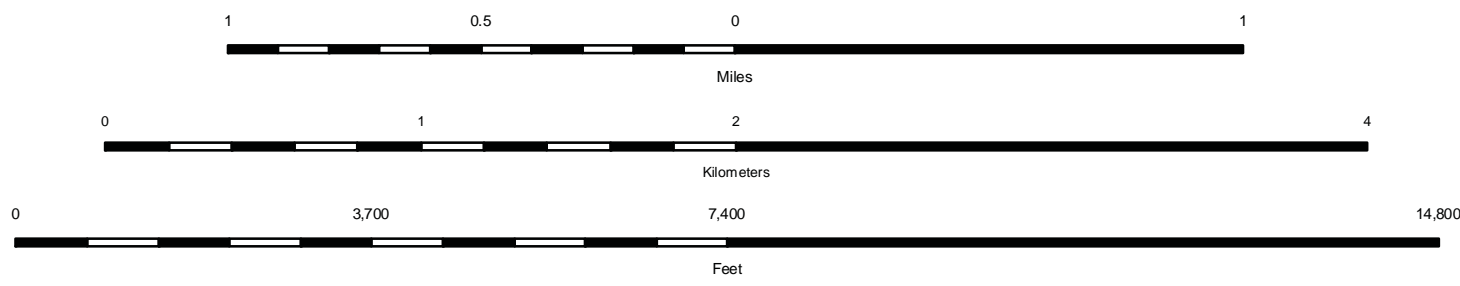
SAN CARLOS INDIAN RESERVATION, ARIZONA,
PARTS OF GILA AND GRAHAM COUNTIES
COBRE GRANDE MOUNTAIN QUADRANGLE
SHEET 70 OF 72

Sheet #67, Beargrass Basin



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North American Datum of 1983 (NAD83).

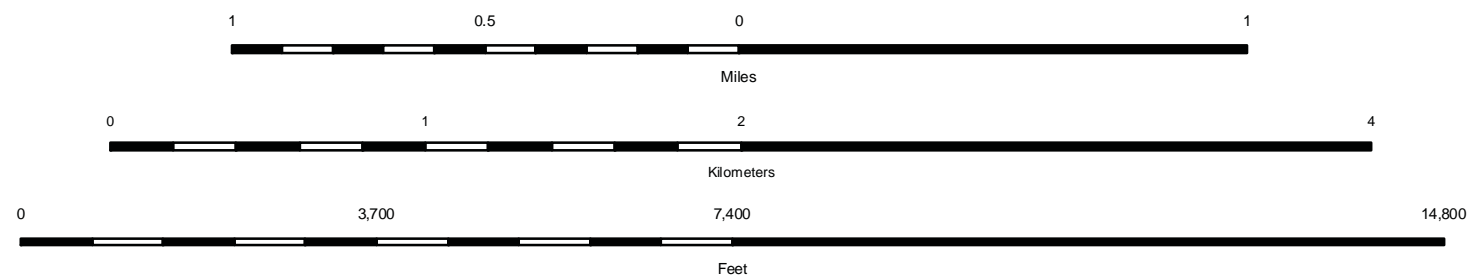


SAN CARLOS INDIAN
RESERVATION, ARIZONA,
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AND GRAHAM COUNTIES
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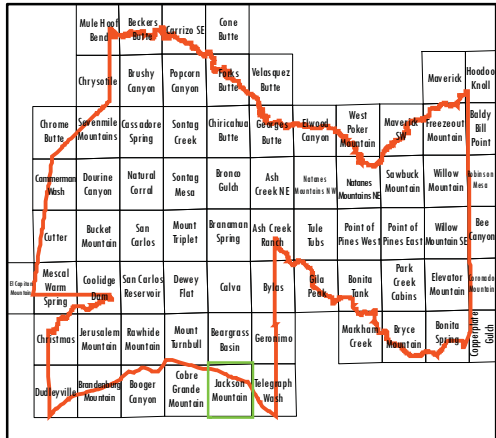


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North American Datum of 1983 (NAD83).



SCALE 1:24000





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North American Datum of 1983 (NAD83).

